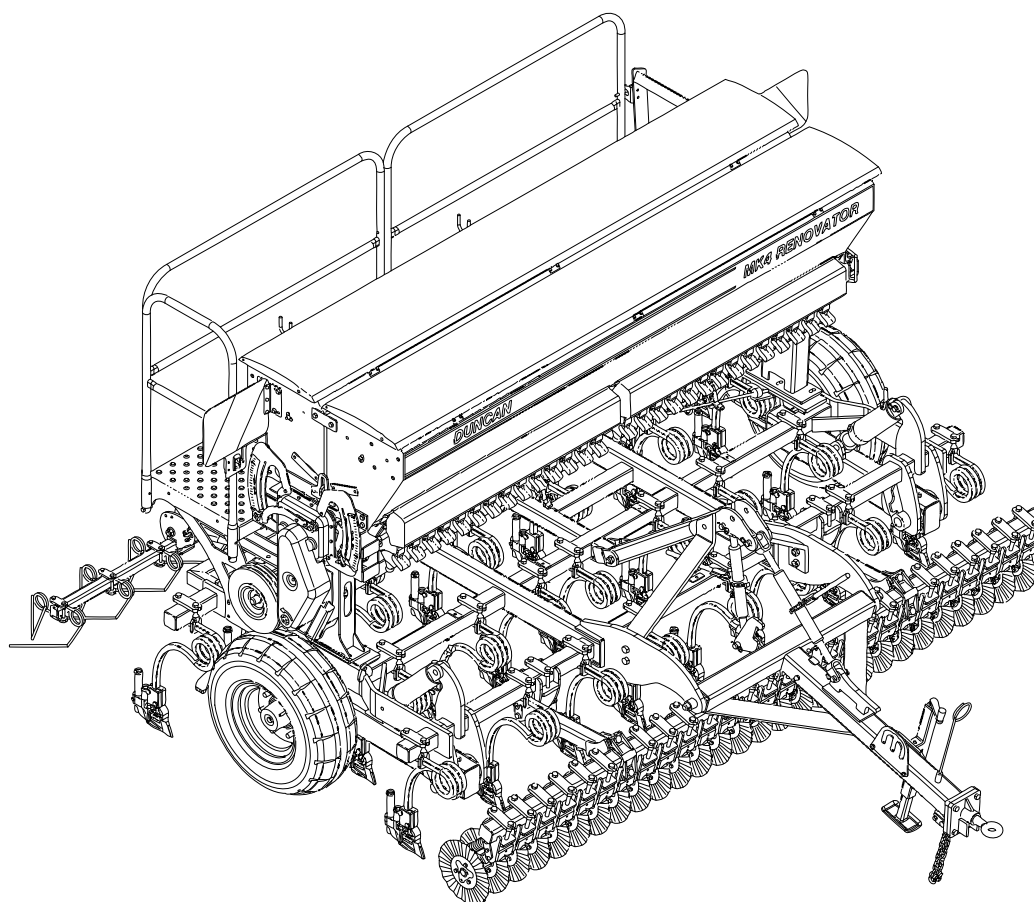


Owners Manual



MK4 Renovator ORIGINAL INSTRUCTIONS



Built to work.

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Introduction

Acquisition & Warranty

On delivery of your new Duncan Renovator please check that the machine is not damaged. In cases of shipping damage, please ask your dealer to arrange for the appropriate claim to be lodged immediately. Assemble any parts supplied loose and inspect your machine with the aid of this manual to familiarise yourself with its features. If you have any queries ask your dealer straight away. The machine is covered by our 12 month warranty on faulty parts, subject to normal use.

Record below the serial number of your machine and keep it in a secure place to help trace the machine and assist us when you order parts.



Model:

Serial No:

Owner:

.....

.....

Delivery Date:

Dealer:

.....

.....

This Document contains the Original Operating Instructions for this machine and are verified by the Manufacturer.

Signed:

Product Development Manager

The Owner's Manual

Your new Duncan Renovator will give long and efficient service if given normal care and operated properly.

This owner's manual is provided so that you can become thoroughly familiar with the design of the machine and to furnish information on correct operation, adjustment and maintenance. **Only persons well acquainted with these guidelines should be allowed to use the equipment.**

A separate illustrated parts section has been provided so that if any parts are required your dealer will be able to supply them by reference to part numbers.

The manual is considered as part of your machine and must remain with the machine when it is sold.

Right and left hand references in this manual are determined by standing behind the machine and facing in the direction of travel.

Disclaimer

Every effort has been made to ensure that the information in this manual was accurate and up to date at the time of going to press. Clough Agriculture reserves the right to make subsequent changes to the machine, where necessary, without notification.

The Company will not be responsible for any damage or consequential loss arising out of misinterpretation or failure to follow recommended procedures. Nor will it be liable for any damage caused by or arising out of modification or misuse of its product.

The owner has a responsibility to protect himself and others by observing all safety information and by ensuring all operators are well acquainted with the safety information, trained in the correct use of the machine and applying safe work practices.

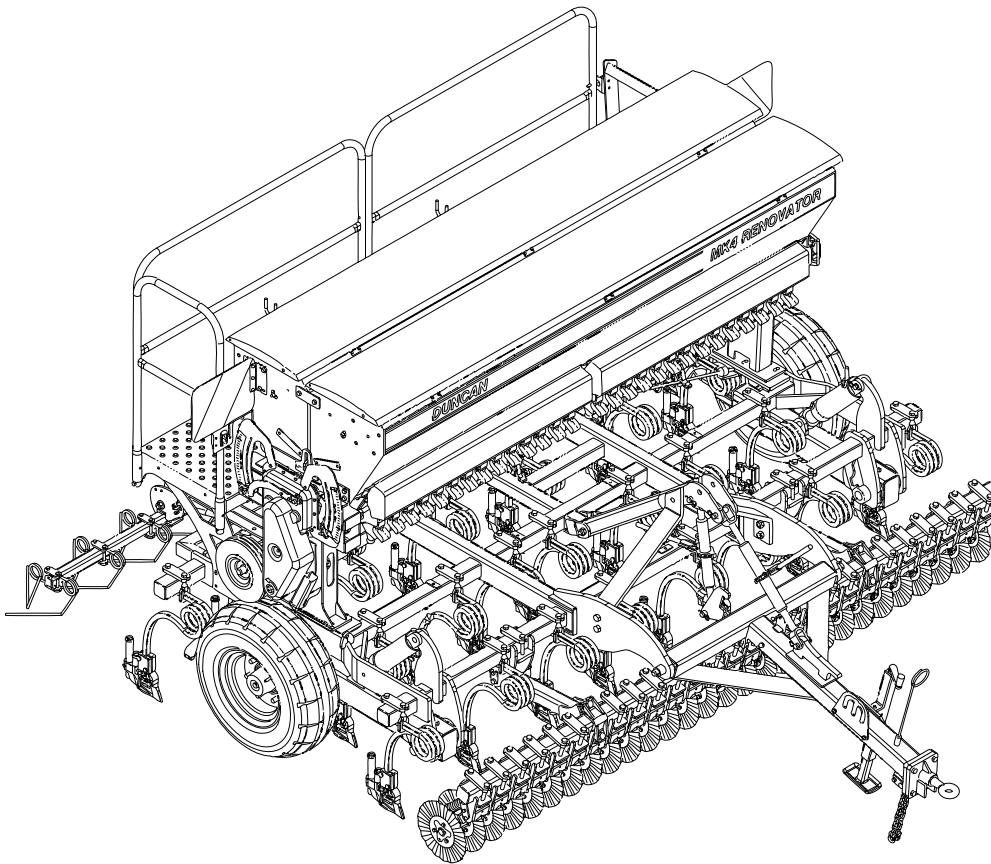


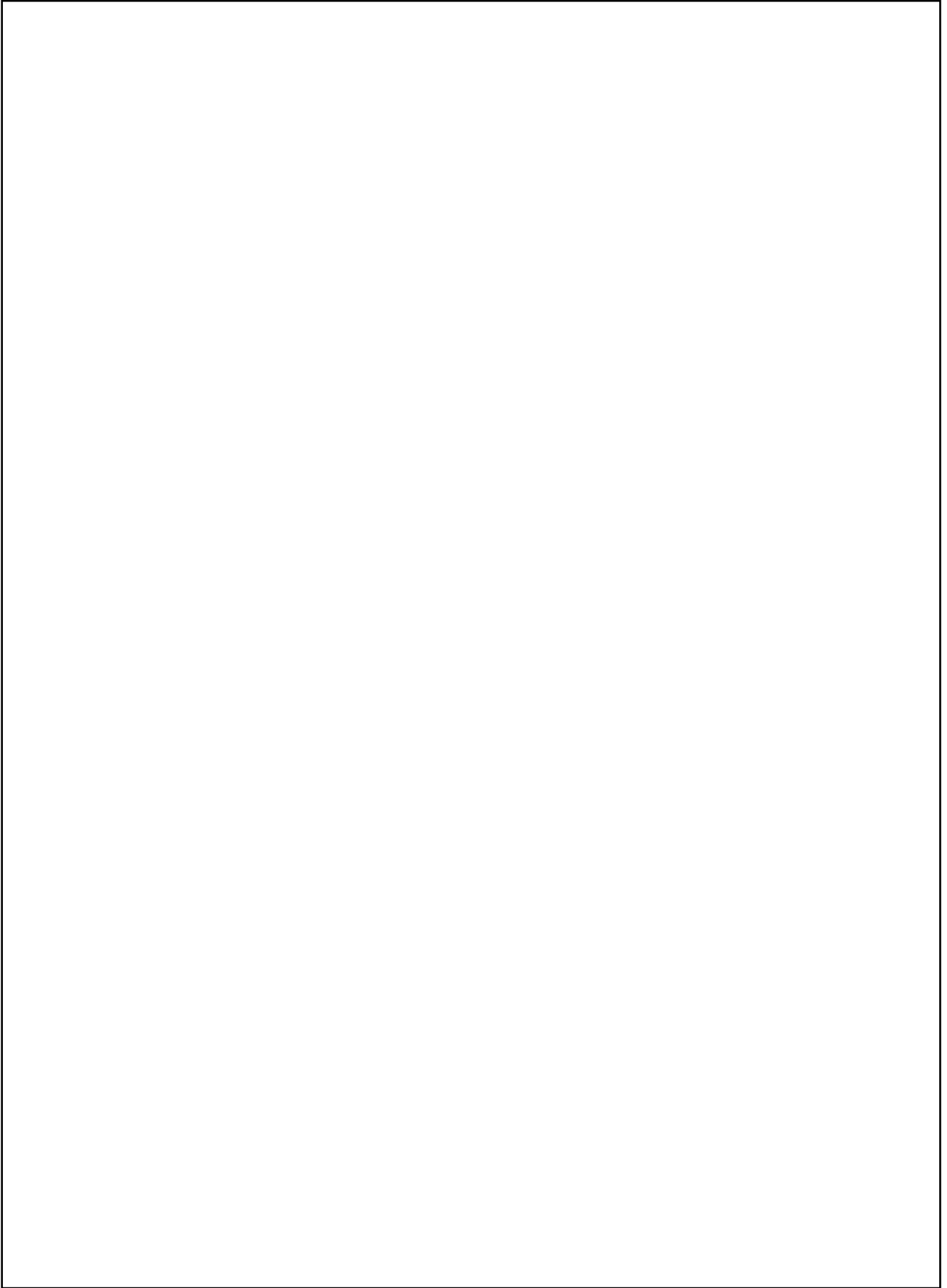
Description of Machine

The Duncan 'Mk4 Renovator' is a Coil Tine T-boot drill. The box is mounted on a robust frame accommodating large diameter tyres. The ground engaging components are controlled by a hydraulic ram system, giving ample control on ground pressure, good transport clearance and contour following ability. Sowing depth is controlled by adjusting the hydraulic ram as required. The quality European type peg roller seeder system handles all seeds from turnip and rape through to peas and maize. The seeders are driven from the groundwheels via a jockey wheel system and variable speed gearbox. For transport, the drive is easily disconnected by raising the drill to its transport height.

Working Principle

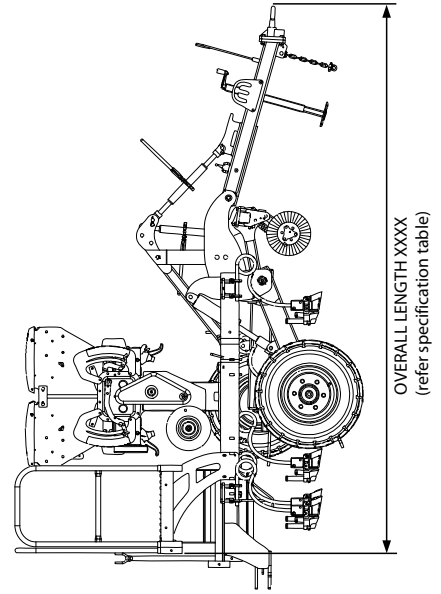
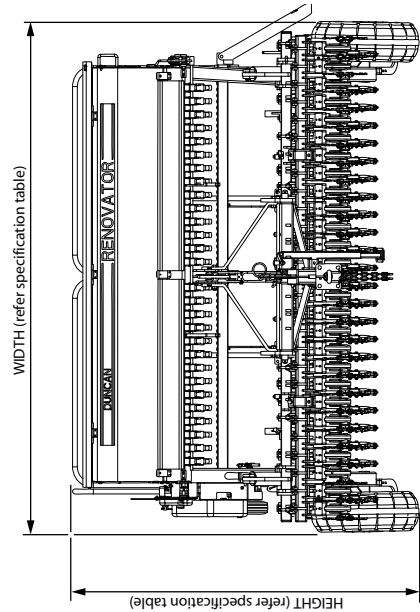
The gearbox, pegged seed rollers and seeder flaps are set to give the desired seed rate. The coil tine and T-boot, create the seed bed. Seed flows down the flexible tubes between seeder and tee-boot units, and drops into the prepared seed bed.





Dimensions & Capacities

Dimensions & Capacities		16 Run	21 Run	24 Run	20 Run	24 Run	28 Run
Description		3m Wide	3m Std	3m Narrow	3.5m Wide	3.5m Std	3.5m Narrow
Width (over wheels /mm)			3070			3570	
Height (Groundwheels up /mm)			2145			2145	
Height (Groundwheels down /mm)			2430			2430	
Overall Length (mm)			3825			3825	
Weight inc. disc openers (unladen)		1850	2030	2130	2220	2360	2490
Tyre Size			10.0/75-15.3 (18 ply AW702)				
Recommended Tyre Pressure			4 bar (58 psi)				
Maximum speed (km/hr)			40 (tyre rating 138A8)				
Jockey Tyre Size			410/350 x 6 x 4 ply				
Jockey Tyre Pressure			3.44 bar (50 psi)				
Row Spacing		178	147.5	125	178	147.5	125
Effective Sowing Width		2848	3097.5	3000	3560	3540	3500
Box Capacity (litres per box)		550	550	550	650	650	650
Small Box Capacity (litres)			70			90	
Maximum Tractor HP Rating			180				





ATTENTION

On the machine important safety information is indicated by these symbols.
These highlight general safety aspects in regard to the machine rather than specific hazards.



Do not ride or allow passengers on the machine.

Under no circumstances are passengers to be permitted on the machine while it is in operation or being transported. Any footboards and/or footsteps are provided solely for the purpose of preparing the machine for use.



Keep clothing and body extremities well clear of pinch points while the machine is operating (seeding or calibrating). Keep well clear of moving parts at all times.

These signs typically occur wherever trapping points exist. These include drive chains, sprockets, shafts, wheels, discs, pivot points, etc. Guards are provided with the machine for safety reasons (where practical without compromising machine performance). Ensure these are always fitted during operation.



Always exercise extreme caution in the vicinity of sharp edges and points.

Where possible guards are provided with the machine for safety reasons (where practical without compromising machine performance). Ensure these are always fitted during operation.



Footboards, footsteps, drawbars and other machine surfaces may be slippery when wet.

Apply extra caution in wet conditions and in the early morning when surfaces are wet.

KEEP CLEAR

Keep Clear. (It is dangerous to be in this area when the machine is operating.)

SAFETY - General

N.B. Throughout this manual important safety information is indicated by these symbols in the margin:



A prohibition should be observed under all circumstances.



A warning indicates a hazard that could cause death or injury if the warning is ignored.



A caution indicates a hazard that may cause damage to property if the caution is ignored.

This section of the manual offers general guidelines for the safe operation of machinery. It does not replace local safety regulations. These guidelines were current at the time of publication, but may be superseded by later regulations.

Clough Agriculture has made every effort to highlight all risks to personnel or property. Owners and operators have a responsibility to exercise care and safe work practices at all times in the vicinity of the machine.

Owners are advised to keep up to date on safety issues and to communicate these to all users of the machine.

Contact the Occupational Safety and Health Service (OSH) for further information about general safety aspects. If you have safety concerns specifically related to this machine, contact your dealer immediately.

Operator Safety

Read this manual carefully before operating new equipment. Learn how to use this machine safely. Be thoroughly familiar with the controls and the proper use of the equipment before using it.



Take careful note of all safety instructions both in this manual and on the machine itself. Failure to comply with instructions could result in personal injury and/or damage to the machine.

Replace missing or damaged safety signs on the machine and ensure that these remain clearly visible.

It is the owner's responsibility to ensure that anyone who operates, adjusts, lubricates, maintains, cleans or uses the machine in any way has had suitable instruction and is familiar with the information in this manual (particularly with regard to safety aspects).

Operators and other users of the machine should be aware of potential hazards and operating limitations.



Be Prepared for Emergencies

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance, hospital and fire department near your telephone.



SAFETY - General (Continued)



WARNING

Appropriate Dress

Wear close fitting clothing and avoid rings or other forms of jewellery which could become caught in the machinery.

People with long hair must have it securely fixed and confined close to the head.

Refer to local safety standards for protective clothing and recommended safety equipment.

Adequate protection, such as a face mask, should be worn if operating this machine in dry and dusty conditions.



WARNING

Transport This Machine Safely

Ensure that all linkage pins and security clips are fitted correctly. With trailing machines tow with the drawbar only, as this is the only safe towing point on the machine.

Always check that bystanders (especially children) are well clear (front and rear) before starting and moving the tractor and the machine.

Plan safe routes of travel, and be aware of power lines and other roadside hazards. Take particular care when towing implements on hillsides.

Do not ride or allow passengers on the machine.

This machine is not designed to carry passengers, and no riders are permitted.



NO RIDE

Road transport

On public roads,

- A speed of 40km/h must not be exceeded.
- Do not operate during the hours of darkness unless standard lights are fitted and clearly visible. (This also applies when visibility is limited, e.g., in foggy conditions.)

See the guidelines in the *Vehicle Dimensions and Mass Rule*, issued by the Land & Transport Safety Authority.

Avoid tip-overs

Avoid holes, ditches and obstructions which may cause the machine to tip over, especially on hillsides. Never drive near the edge of a gully or steep embankment - it might cave in. Slow down for hillsides, rough ground and sharp turns.



SAFETY - General (Continued)



Handle Agricultural Chemicals Safely

All farm chemicals should be stored, used, handled and disposed of safely and in accordance with the supplier's/manufacturer's recommendations.



Read the product label before using, noting any warnings or special cautions, including any protective clothing or equipment that may be required, ie. respirator.

Do not eat or smoke while handling sprays, fertilisers, coated seeds, etc. Afterwards, always wash your hands and face before you eat, drink, smoke, or use the toilet.



Store sprays, fertilisers, coated seeds, etc. out of reach of children and pets, and away from food and animal feeds.

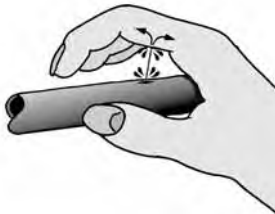
Any symptoms of illness during or after using chemicals should be treated according to the supplier's/manufacturer's recommendations. If severe, **call a physician or get the patient to hospital immediately**. Keep the container and/or label for reference.

Avoid High Pressure Fluids

Avoid any contact with fluids leaking under pressure, because the fluids can penetrate the skin surface.



Any fluid which penetrates the skin, will need to be **removed immediately by a medical expert**. Seek specialist advice on this type of injury.



Relieve the pressure before disconnecting any hydraulic or other lines. Make all repairs and tighten all fittings before re-connection to pressurised fluid.

Keep your hands and body away from any pinholes or high pressure jets. Search for leaks with a piece of cardboard instead of using your hand directly.

Safe Work Practices

All farm machinery is potentially dangerous and should be treated with caution and respect.

Before starting the machine, ensure that all controls are placed in neutral and that bystanders are well clear. Check that the guards have been securely fitted and that any adjustments have been made correctly.



Where possible, disconnect or isolate the drive mechanism to the implement. Lower the machine onto the ground when not in use.

Do not operate this equipment when severe weather conditions appear imminent.

SAFETY - General (Continued)



Practice Safe Maintenance

Keep the machine in safe working condition. Routine maintenance and regular servicing will help reduce risks and prolong the life of the machine.

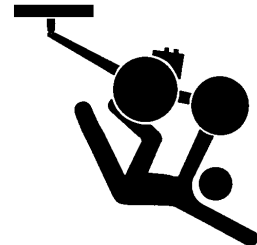
General Maintenance

Accidents occur most frequently during servicing and repair. The following general rules must be followed when maintaining or working with machinery:

- All operating and maintenance manuals must be read before and referred to while using or servicing any piece of equipment.
- Turn off all machinery power sources and isolate the machine before making adjustments, doing lubrication, repairs or any other maintenance on the machine.
- Ensure that the machine hydraulics are disconnected from the power source.
- Wear gloves when handling components with cutting edges, such as any ground cutting components.
- Beware of hazards created by springs under tension or compression when dismantling or maintaining the machine.
- It is recommended that you clean the machine with a water blaster or similar apparatus before commencing maintenance.

Make Sure the Machine is Well Supported

When machinery is fitted with hydraulics, do not rely on the hydraulics to support the machine. During maintenance or while making adjustments under the machine, always lock the hydraulics and support the machine securely. Place blocks or other stable supports under elevated parts before working on these.



Electrical Maintenance

Disconnect the electrical supply from the tractor before doing any electrical maintenance.



Welding

With electronic equipment in modern tractors it is advisable to disconnect the machine from the tractor, or at least disconnect the alternator and battery before attempting any welding.



Use Only Genuine Spare Parts

Unauthorised modifications or non-genuine spare parts may be hazardous and impair the safe operation and working life of the machine.

Excess lubricants must be disposed of safely so as not to become a hazard.

SAFETY - Machine Specific

This section of the manual gives specific guidelines for the safe operation of the Renovator.

These guidelines were current at the time of publication, but may be superseded by later circumstances. They do not necessarily cover every possible hazard and must be read in conjunction with the **SAFETY - General** section (Page 7 to 10).

Hazard Points on the Renovator

The lists below are not all-inclusive and serve only to highlight the more obvious areas of risk.



The decals attached to the machine are a general reminder that there are hazardous areas on the machine, rather than specifically highlighting all possible hazards.

For decal locations on machine, refer Page 13.



No Ride

Passengers are not permitted anywhere on the machine.



Pinch Points/Moving Parts

Hazardous areas include:

- Drive chains.
- Sprockets between the drive wheel, the transfer shaft and the gearbox (RH side).
- Sprockets between the gearbox and the box shafts (RH side).
- Agitator drive units (LH side).
- Agitator shaft inside the boxes.
- Seeder units, box shaft and shaft connectors.
- Wheel legs and main frame assemblies
- Between discs and other sub-assembly parts (where fitted).
- Finger tine assemblies (where fitted).



**Slippery
When
Wet**

Slippery When Wet

Hazardous areas include:

- Footboards and footstep.
- All smooth surfaces on the frame structure.

KEEP CLEAR

Keep Clear

Hazardous areas include:

- Between the tractor and Renovator.
- Immediately adjacent to the Renovator side.

SAFETY - Machine Specific (Continued)



Hazard Points on the Renovator (Continued)

Pedestal Chain Guards

To prevent hands, etc. getting caught in drive chains, guards are provided to cover sprockets, chain and chain tensioners mounted about the drive pedestal (RHS). These guards must be fitted while using the machine.

Warning: Access to pinch points is still possible from underneath the guard.

For guard locations on machine, refer Page 13.

Calibrating

Be particularly careful when calibrating the seeding rate. At this time, the calibration trays have been removed and are no longer covering the rotating seeder units. See **Pinch Points/ Moving Parts** (Page 11) for hazardous areas.

Transport

The two wheels located at the sides of the machine are for the purpose of controlling sowing depth. These are also used to support the machine weight during transport (while linked to the tractor).



Important - Refer to safety cautions in the **Transport** section, page 14 of the manual. Ensure that all linkage pins and security clips are fitted correctly.

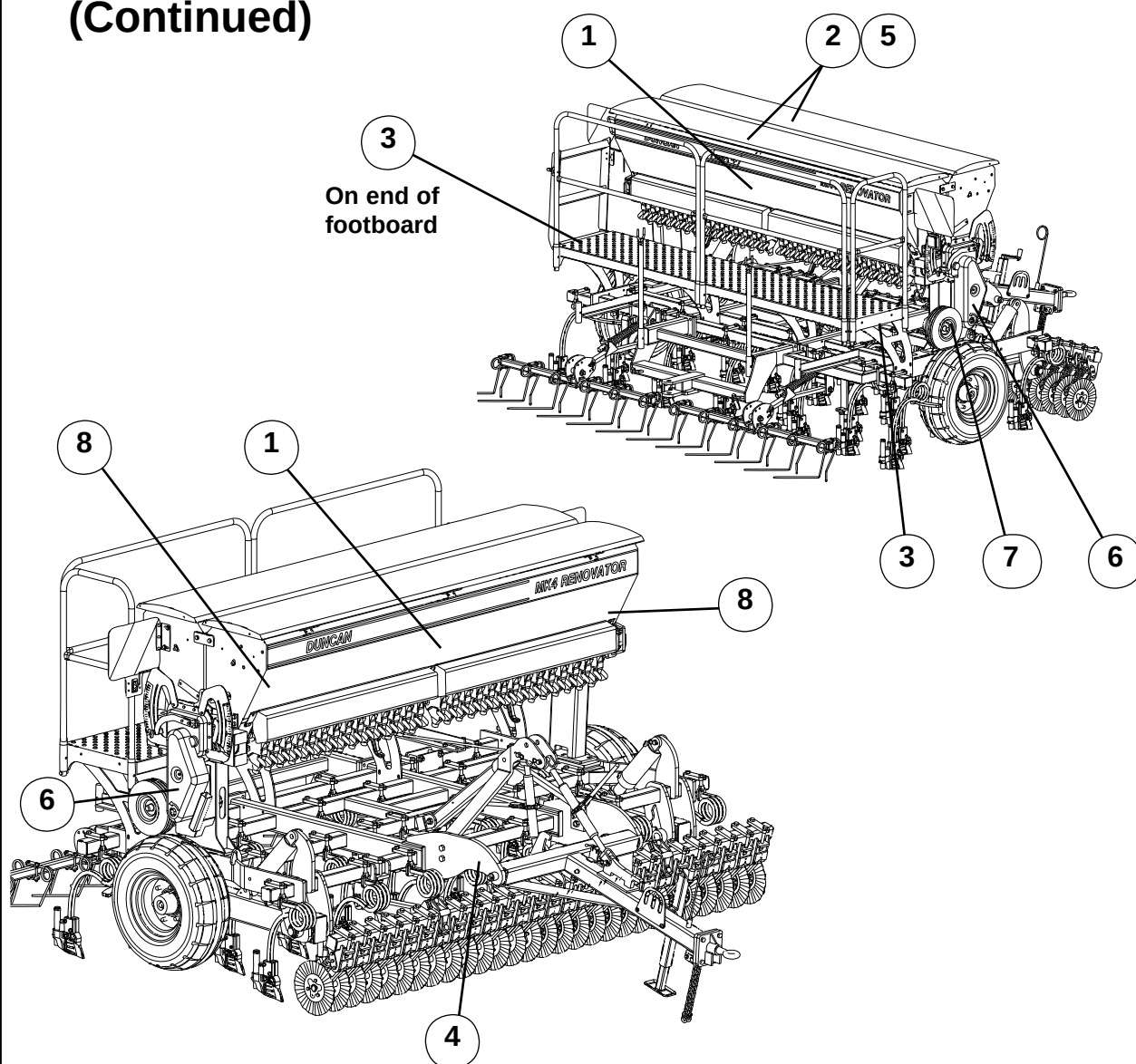
Maintenance

Refer Page 32 for reference to the **Maintenance and Care** section of the manual.

Lubrication

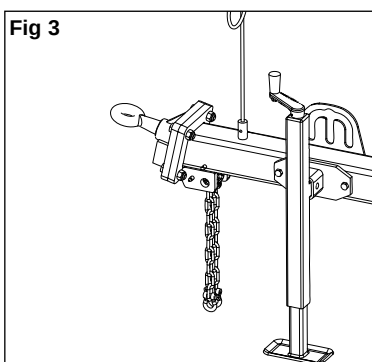
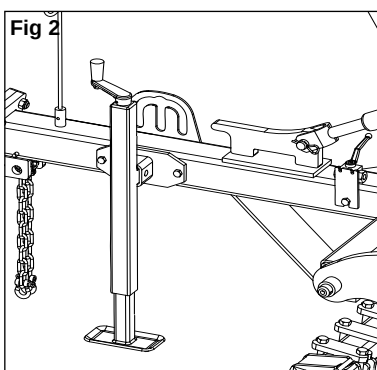
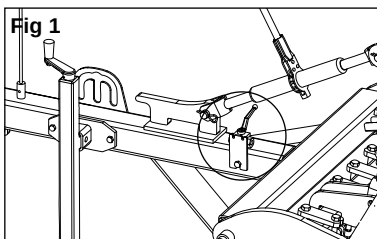
Refer Page 33 for reference to the **Maintenance and Care** section of the manual.

SAFETY - Machine Specific (Continued)



Item	Decal/Guard	Pt. No.	Qty
1	'No Ride'	43900	3
2	'Pinch Point/Moving Parts'	43901	5
3	'Slippery When Wet'	43902	2
4	'Keep Clear'	43904	2
5	Arrows (Inside Box Lid)	43905	4
6	Pedestal Drive Guard (Dual box machine)	25995	1
6	Pedestal Drive Guard (Single box machine)	25996	1
7	Jockey Drive Swing Guard	25745	1
8	'40 km/hr'	43912	2

Table 2



Transport

- 1 Raise the drill into the transport position and hold at the full extent of the rams for a few seconds to allow cylinders to rephase/equalise.

- 2 **Important** - To avoid machine damage due to drill lowering during transport, always close the hydraulic valve on the drawbar. Move the handle to a position at 90° to the hydraulic line as shown in Fig 1. This applies to the drawbar and disc opener hydraulic valves where fitted.

- 3 Locate jack stand in transport position, if fitted. Refer Fig 2.

- 4 Ensure lighting and oversize warning requirements meet recommendations published by the local Land Transport Authority or equivalent.

- 5 **Maximum towing speed 40 km/hr.**
For countries other than New Zealand greater speed restrictions may apply, please refer to your local transport authority.

Ensure towing vehicle requirements are adequate for the towed vehicle e.g. mass, brakes. Refer to recommendations published by the local Land Transport Authority or equivalent.

Braking when towing can cause the load to jackknife. Use extra care when towing in adverse conditions such as mud, inclines and sharp bends.

Lower towing speeds are recommended on farm roads/tracks and where one wheel is on or over a road verge.

- 6 **Attach safety chains to tractor.** Refer Fig 3. Safety chains must be crossed over underneath the coupling and attached to the towing vehicle. The attachment points must be as close as practical to the towing coupling and one each side. The towbar on the towing vehicle must be rated for the towed mass. **Do not remove or replace the safety chains provided with any other than those specified in the parts manual.**
Note: The safety chains are provided with sufficient length to cater for all towing vehicles. Safety chains must be shortened by cutting off excess length so that if the coupling fails the drawbar will not hit the ground.

- 7 If the machine is fitted with row markers or other vertical extensions, check clearance under power lines en route.



- 8 **Important** - For greater disc opener ground clearance, adjust the ram or turnbuckle on the disc opener unit so they are at maximum height, and/or extend the drawbar ram or turnbuckle to level the machine chassis.

Operation

General Operation Guidelines

- 1 Use a sufficiently powerful tractor which is heavy enough to tow the drill safely.
- 2 Operate the drill at a speed of 6-12 km/hr (4-8 mph). In stony and uneven ground conditions a lower speed is more appropriate
- 3 Check that the drill is level during calibration and while seeding.
- 4 Check tyre pressure before seeding. Refer page 5.
- 5 Double check seed rates before seeding.
- 6 Raise the drill out of the ground when making any turns.
- 7 Raise the drill out of the ground before backing up.
- 8 After prolonged storage, check to see that all drive mechanisms and hydraulic equipment are functioning correctly. Check that the seed tubes are not perished or blocked.

Sowing Speed

Typical travel speeds when sowing range from 6-12 km/hr in good conditions. In stoney and uneven ground conditions a lower speed is recommended to minimise rapid part deterioration. Sowing too fast can result in:

- 1 Poor contour following and uneven sowing depth.
- 2 Impact damage to:
 - a Ground engaging components.
 - b Bearings, housings & axles.
 - c Fasteners & structural components.
- 3 More extreme conditions will result in greater vibration and uneven seed flow at low seeding rates.

Sowing Depth Control

The sowing depth is dependent on:

- 1 The wheel height in relation to the chassis
- 2 Tyre pressure
- 3 Ground condition i.e. hard or soft

The wheel height in relation to the chassis is controlled using the threaded depth adjustment collar (1) on the non-drive wheel leg ram. The rams are phasing and only require depth stops under the master cylinder.

Caution: Do not overextend the thread depth adjustment collar. Additional collars may be required.

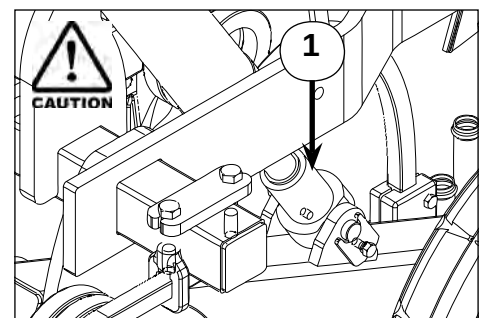


Fig 4

Level Drill

Use the drawbar turnbuckle or ram to tilt the drill so it is sitting level. An adjustment may be required after a short period of use because the paint wears off the discs and the discs sharpen which in turn improves the penetration abilities.

Ensure that the front and rear rows are at an even depth.

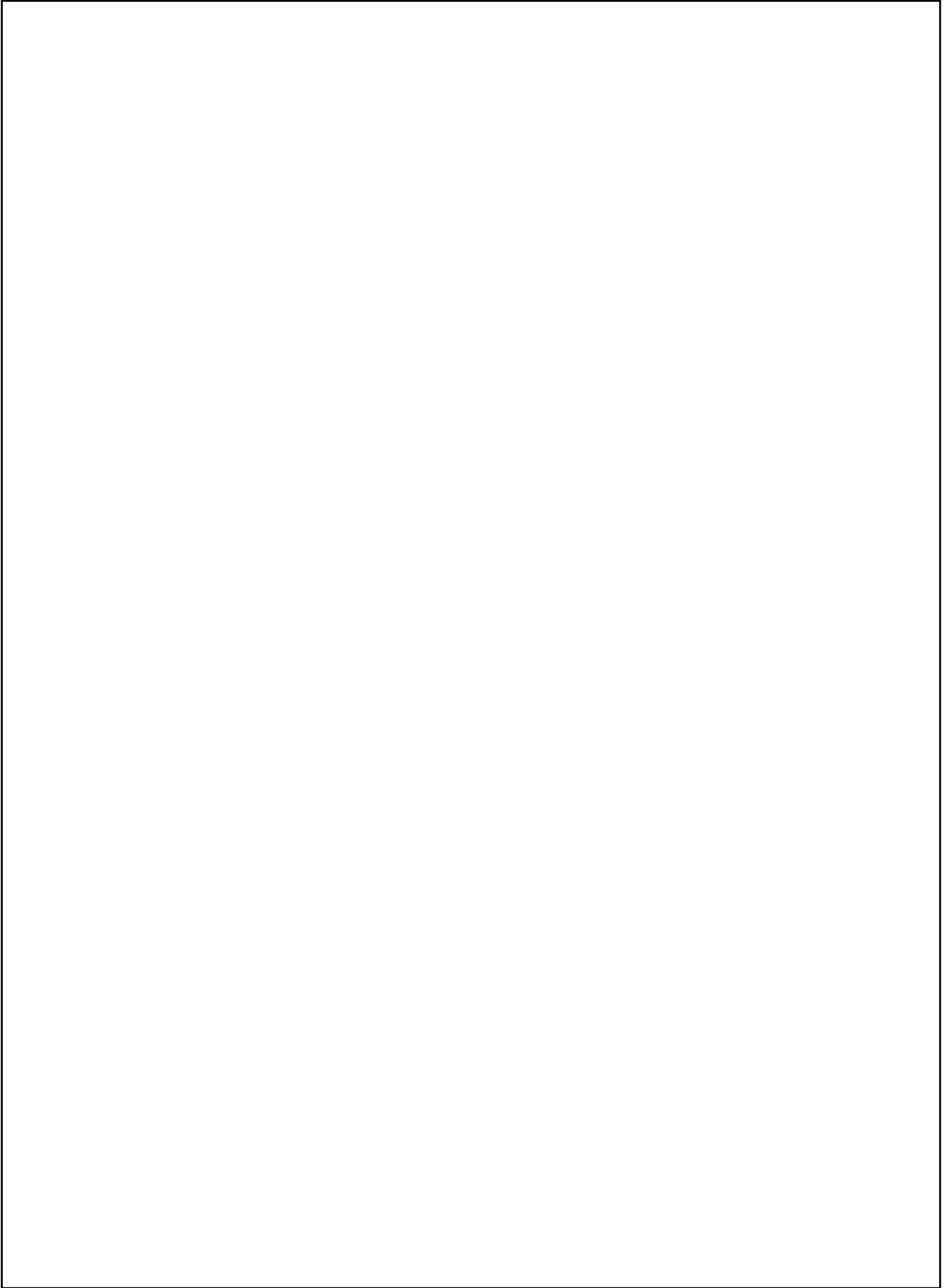
Transport Position

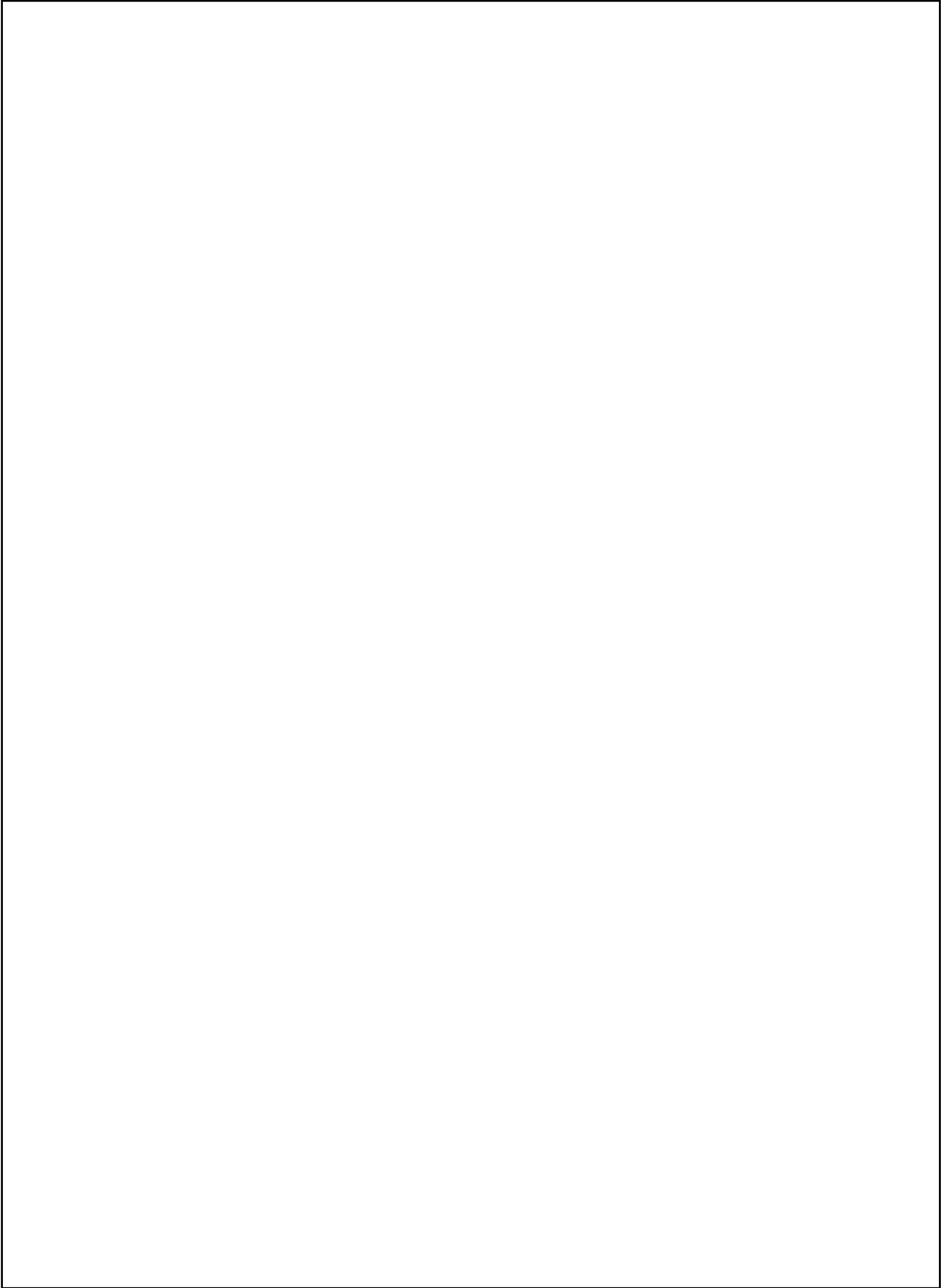
When in the transport position the hydraulic cylinders are fully extended. In this position the cylinders fully equalise by allowing oil to bypass the master cylinder piston. It is recommended to raise the drill into the transport position when turning at headlands or regularly to counteract the effects of oil leakage past the piston and ensure cylinder rods are equally extended and minimise variations in sowing depth.

Coulter Penetration Depth

To create the ideal seed bed the disc opener coulter should cut approximately 20mm below the inverted tee point. In hard and dry conditions this may not be achievable, and better machine/sowing performance may be achieved without using the disc openers. An indication of this will be the machine bouncing which will result in uneven sowing depth.

Coulters will give better penetration ability as they sharpen with use.





MK 4 Renovator Seed Drill Sowing Chart

Table 3

High & Low Ratio - Wide Row Spacing 180

16 Run 3m and 20 Run 3.5m

180

PRODUCT	Shutter Slide*	Bottom Flap	Metering Wheel*	Seed Rate (kg/ha)											Agitator Shaft
				Gearbox Setting Position											
	Hi/Low	Position		Type	15	20	30	40	50	60	70	80	90	100	Connected
Wheat	H	3/4	3	N					84	105	125	148	170	192	Connected
Oats	H	Full	3	N					81	101	120	141	161	180	Connected
Barley	H	Full	3	N					97	119	144	168	194	218	Connected
Ryecorn	H	3/4	3	N					98	121	146	170	197	221	Connected
White Peas	H	3/4	3	N			92	133	175	202	250	294	325	374	Disconnected
Green Peas	H	3/4	3	N			64	96	128	157	189	224	259	292	Connected
Peren. Grass	H	Full	3	N	5.3	11	22	34	44	55	66				Connected
Annual Grass	H	Full	3	N	6.6	13	26	38	50	63					Connected
Pasture Mix*	H	Full	3	N		11	22	34	44	55	66				Connected
Lucerne	H	3/4	1	F			7.4	11	15	18	21				Disconnected
Turnip	L	3/4	1	F	0.8	1.5	2.6	3.8	4.9						Disconnected
Kale	L	3/4	1	F		1.4	2.6	3.9	4.9						Disconnected
Swedes	L	3/4	1	F	0.8	1.3									Disconnected
Rape	L	3/4	1	F		1.3	2.5	3.6	4.8						Disconnected
White Clover	L	3/4	1	F	0.7	1.3	2.5	3.7	4.6						Disconnected
Red Clover	L	3/4	1	F		1.6	2.9	4.1	5.5	6.7	8.0				Disconnected
Super Phosphate	H	Full	3	N			75	115	152	193	235	282	325	374	Connected
DAP Granules	H	Full	3	N					143	175	211	247	284	314	Connected
Super Phosphate	L	Full	3	N				44	58	74	90	108	125	150	Connected
DAP Granules	L	Full	3	N								95	109	120	Connected

Gear Ratio*: H, High = 21T on Transfer Shaft,
13T on Gearbox Input Shaft.
L, Low = 13T on Transfer Shaft,
21T on Gearbox Input Shaft.

Shutter Slide*: For Grain, changing the Shutter Slide from 3/4 to Full gives
10% to 15% more flow.

Pasture Mix*: Test Mixture = 72% Perennial Grass, 8% White Clover,
8% Cocksfoot, 8% Concord, 4% Red Clover

Bottom Flap*: The values shown were the optimum test settings,
decreasing the gap may cause seed damage, too large a gap will give
intermittent flow rates. (Flaps are spring loaded to cope with small
variations in seed/granule size).

Metering Wheel*: N = Normal Metering Wheel (Both)
F = Small Metering Wheel

TSW*: $\frac{\text{TSW(gm)} \times \text{Desired Plants/m}^2}{\text{Germination \%}} = \text{Sowing Rate (Kg/Ha)}$

Notes

1. Where a small seeds box is used, multiply
the above seed rates by **0.80** to account for
the different gearing ratio.

2. Seed rates shown are approximate only
for the respective gearbox setting. It is
recommended that the calibration procedure
is always used. Refer to
page 16.

3. To sow at rates under 30kg/Ha we
recommend using the Low Ratio.

Table 4

MK4 Renovator Seed Drill Sowing Chart

High & Low Ratio - Standard Row Spacing 147.5

21 Run 3m and 24 Run 3.5m

147.5

PRODUCT	Shutter Slide*	Bottom Flap	Metering Wheel*	Seed Rate (kg/ha)										Agitator Shaft	
				Gearbox Setting Position											
	Hi/Low	Position		Type	15	20	30	40	50	60	70	80	90	100	
Wheat	H	3/4	3	N					102	128	152	180	208	234	Connected
Oats	H	Full	3	N					99	123	146	172	197	220	Connected
Barley	H	Full	3	N					118	145	176	205	237	266	Connected
Ryecorn	H	3/4	3	N					119	148	178	207	241	270	Connected
White Peas	H	3/4	3	N			112	162	213	246	305	359	397	457	Disconnected
Green Peas	H	3/4	3	N			78	117	156	192	231	273	316	356	Connected
Peren. Grass	H	Full	3	N	6.5	14	27	41	54	67	81				Connected
Annual Grass	H	Full	3	N	8.1	16	32	46	61	77					Connected
Pasture Mix*	H	Full	3	N		14	27	41	54	67	81				Connected
Lucerne	H	3/4	1	F			9.0	14	18	22	26				Disconnected
Turnip	L	3/4	1	F	1.0	1.8	3.2	4.6	6.0						Disconnected
Kale	L	3/4	1	F		1.7	3.2	4.7	6.0						Disconnected
Swedes	L	3/4	1	F	1.0	1.6									Disconnected
Rape	L	3/4	1	F		1.6	3.0	4.4	5.8						Disconnected
White Clover	L	3/4	1	F	0.8	1.6	3.1	4.5	5.6						Disconnected
Red Clover	L	3/4	1	F		1.9	3.6	5.0	6.7	8.2	9.8				Disconnected
Super Phosphate	H	Full	3	N			91	140	185	235	287	344	397	457	Connected
DAP Granules	H	Full	3	N					174	214	257	302	346	383	Connected
Super Phosphate	L	Full	3	N				54	71	90	110	132	152	183	Connected
DAP Granules	L	Full	3	N								116	133	147	Connected

Gear Ratio*: H, High = 21T on Transfer Shaft,
13T on Gearbox Input Shaft.
L, Low = 13T on Transfer Shaft,
21T on Gearbox Input Shaft.

Shutter Slide*: For Grain, changing the Shutter Slide from 3/4 to Full gives
10% to 15% more flow.

Pasture Mix*: Test Mixture = 72% Perennial Grass, 8% White Clover,
8% Cocksfoot, 8% Concord, 4% Red Clover

Bottom Flap*: The values shown were the optimum test settings,
decreasing the gap may cause seed damage, too large a gap will give
intermittent flow rates. (Flaps are spring loaded to cope with small
variations in seed/granule size).

Metering Wheel*: N = Normal Metering Wheel (Both)
F = Small Metering Wheel

TSW*: $\frac{\text{TSW(gm)} \times \text{Desired Plants/m}^2}{\text{Germination \%}} = \text{Sowing Rate (Kg/Ha)}$

Notes

1. Where a small seeds box is used, multiply
the above seed rates by **0.80** to account for
the different gearing ratio.

2. Seed rates shown are approximate only
for the respective gearbox setting. It is
recommended that the calibration procedure
is always used. Refer to
page 16.

3. To sow at rates under 30kg/Ha we
recommend using the Low Ratio.

MK 4 Renovator Seed Drill Sowing Chart

Table 5

High & Low Ratio - Narrow Row Spacing 125

24 Run 3m and 28 Run 3.5m

125

PRODUCT	Shutter Slide*		Bottom Flap*	Metering Wheel*	Seed Rate (kg/ha)										Agitator Shaft
					Gearbox Setting Position										
					Hi/Low	Position		Type	15	20	30	40	50	60	
Wheat	H	3/4	3	N					121	152	180	213	246	277	Connected
Oats	H	Full	3	N					117	146	173	204	233	260	Connected
Barley	H	Full	3	N					140	172	208	243	281	315	Connected
Ryecorn	H	3/4	3	N					141	175	211	245	285	320	Connected
White Peas	H	3/4	3	N			133	192	252	291	361	425	470	541	Disconnected
Green Peas	H	3/4	3	N			92	139	185	227	274	323	374	422	Connected
Peren. Grass	H	Full	3	N	7.7	17	32	49	64	79	96				Connected
Annual Grass	H	Full	3	N	10	19	38	55	72	91					Connected
Pasture Mix*	H	Full	3	N		17	32	49	64	79	96				Connected
Lucerne	H	3/4	1	F			11	17	21	26	31				Disconnected
Turnip	L	3/4	1	F	1.2	2.1	3.8	5.4	7.1						Disconnected
Kale	L	3/4	1	F		2.0	3.8	5.6	7.1						Disconnected
Swedes	L	3/4	1	F	1.2	1.9									Disconnected
Rape	L	3/4	1	F		1.9	3.6	5.2	6.9						Disconnected
White Clover	L	3/4	1	F	0.9	1.9	3.7	5.3	6.6						Disconnected
Red Clover	L	3/4	1	F		2.2	4.2	5.9	7.9	10	12				Disconnected
Super Phosphate	H	Full	3	N			108	166	219	278	340	407	470	541	Connected
DAP Granules	H	Full	3	N					206	253	304	358	410	453	Connected
Super Phosphate	L	Full	3	N				64	84	107	130	156	180	217	Connected
DAP Granules	L	Full	3	N								137	157	174	Connected

Gear Ratio*: H, High = 21T on Transfer Shaft,
13T on Gearbox Input Shaft.
L, Low = 13T on Transfer Shaft,
21T on Gearbox Input Shaft.

Shutter Slide*: For Grain, changing the Shutter Slide from 3/4 to Full gives
10% to 15% more flow.

Pasture Mix*: Test Mixture = 72% Perennial Grass, 8% White Clover,
8% Cocksfoot, 8% Concord, 4% Red Clover

Bottom Flap*: The values shown were the optimum test settings,
decreasing the gap may cause seed damage, too large a gap will give
intermittent flow rates. (Flaps are spring loaded to cope with small
variations in seed/granule size).

Metering Wheel*: N = Normal Metering Wheel (Both)
F = Small Metering Wheel

TSW*: $\frac{\text{TSW(gm)} \times \text{Desired Plants/m}^2}{\text{Germination \%}} = \text{Sowing Rate (Kg/Ha)}$

Notes

1. Where a small seeds box is used, multiply
the above seed rates by **0.80** to account for
the different gearing ratio.

2. Seed rates shown are approximate only
for the respective gearbox setting. It is
recommended that the calibration procedure
is always used. Refer to
page 16.

3. To sow at rates under 30kg/Ha we
recommend using the Low Ratio.

Basic Calibration Procedure

Gearbox Setting Lever

To set the seed rate at the gearbox, slacken the tri knob (1) by turning counter-clockwise and push from below into the position indicated in the Sowing Chart. Retighten the star knob firmly (Fig 6).

Important

The settings shown in the Sowing Charts (kg/ha) can only serve as reference values. Deviations may occur caused by differences in the size, shape, density of the grain and by the dressing agent. **Therefore prior to any sowing, always carry out calibration trials to accurately determine the actual seed rate.**

Using the stepless variable speed gearbox, the speed of the metering shaft and thus the seed rate is set steplessly. The higher the figure indicated on the scale by the setting lever the greater the seed rate (Fig 6).

Selecting the Gear Ratio

The Seed Drill is designed with a two speed (high and low) gear ratio arrangement where the moving of the chain from a 21 x 13 teeth ratio to a 13 x 21 teeth ratio changes the output from high to low (Fig 7). The selection and method for changing the ratio is detailed under Speed Setting Page 27.

Setting Seeder Shutter Slides

The varying flow properties of seeds require different shutter slide positions which may be found in the Sowing Chart for the individual type of seed. This corresponds to one of the three settings in Fig 8.

Fig 8/A	Fig 8/B	Fig 8/C
Closed	3/4 Open	Fully Open

Bottom Flap Settings

The various seed sizes require matching bottom flap clearances below the metering wheel. The adjusting plate allows for 10 different settings. The required position for the seed type may be found in the Sowing Chart. The control levers are located on the LH end of the seedbox, (opposite end to the gearbox).

Number "1" corresponds to the minimum (closed) position and "10" the maximum gap (Fig 9).

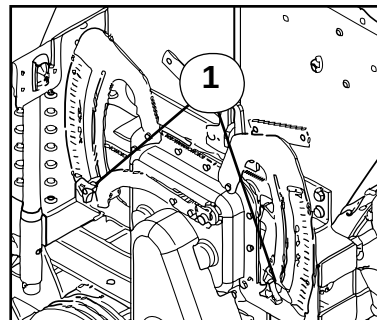


Fig 6

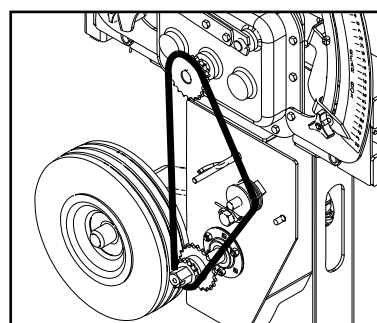


Fig 7

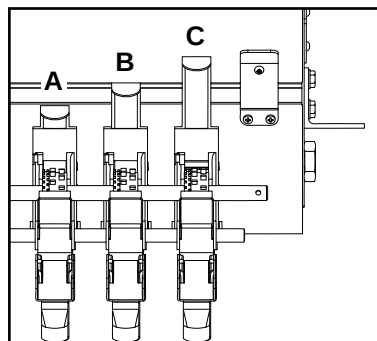


Fig 8

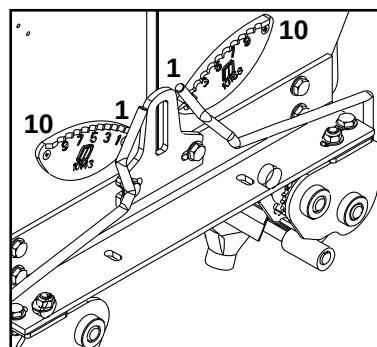


Fig 9

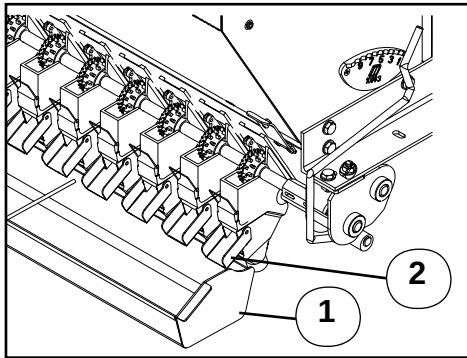


Fig 10

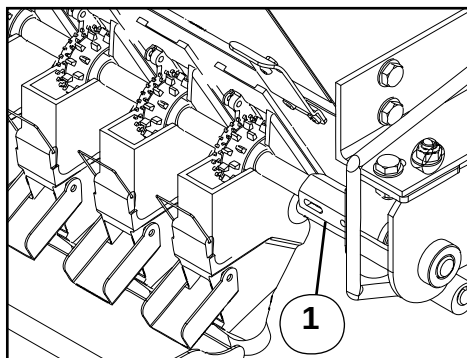


Fig 11

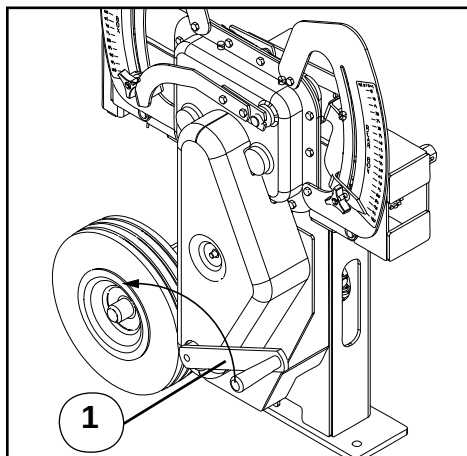


Fig 12

Basic Calibration Procedure (Continued)

Seed Calibration

The calibration test should be done to confirm the required seed rate and is done with the drill stationary and level.

Seed Calibration Procedures

- 1 Remove the calibration tray from the storage brackets on the seedbox. Place the calibration tray (1) on the support members below the seeders (Fig 10).
 - 2 Position all the clear plastic seed diverters (2) to redirect the seed into the calibration tray (Fig 10).
 - 3 Make sure all the shutters are open and set to the position indicated in the seed charts for the particular seed.
 - 4 Agitator Shaft - Check the Seed Chart "Hints" (Table 3) whether to connect or disconnect the shaft by removing the M10 bolt (1) during seeding (Fig 11).
 - 5 For the test, half fill the box with seed. If this is not possible make sure the seed is evenly distributed within the box.
 - 6 For setting method refer to Basic Calibration Procedures (Page 22).
- Note** For seeds which are not covered in the respective Sowing Chart (Page 19 to 21), use the figures for a seed of comparable size and shape.
- 7 Place the crank handle (1) over the hexagonal drive dog on the transfer shaft and turn anti-clockwise until the seed flows consistently from the seeders (Fig 12). To ensure complete filling of the seed unit continue turning the crank until an even flow of seed is coming out of the seeder units, then empty into the seedbox. The drill is now ready for calibration.
 - 8 Turn the crank handle anti-clockwise the required number of revolutions as detailed in Table 5.

Note The Calibration is usually done for 1/40th hectare. For very small seed rates or when using inaccurate scales (i.e. unable to measure to the nearest gram) the calculation based on 1/10th hectare should be used.

Scales must be accurate to 2 grams as any error will be multiplied by either 10 or 40 giving inaccurate calibration results.

Basic Calibration Procedure (Continued)

Hand Crank Turns for Seed Rate Calibration

The tables represented below are for arable conditions (**worked ground**) and are calculated to indicate an average situation. If there is any doubt as to the accuracy of these figures for the conditions, it is advisable to run checks on the calibration figures listed. Refer Page 26, (**Wheel Slip Deviations**). Check and record which tyres are fitted to your drill, to ensure use of the correct Hand Crank Turn and Constant figures.

Machine Size	Row Spacing(mm)	Sowing Width (m)	Turns for 1/40 Hectare	Turns for 1/10 Hectare
16 Run	180	2.88	32	127
20 Run	180	3.60	25	101
21 Run	147.5	3.10	29.5	118
24 Run	147.5	3.54	26	103
24 Run	125	3.00	30.5	122
28 Run	125	3.50	26	104

- 9 Weigh the seed collected during the test in kilograms.

Caution: Scales must be accurate to 2 grams, as any error will be multiplied by either 10 or 40, giving inaccurate calibration results.

- 10 Calculate the seed rate by multiplying the kgs previously collected x 40 (1/40th ha method, refer Table 6) or x 10 (1/10th ha method, refer Table 7) depending on the requirement. If the resultant calculation does not produce the desired seed rate use the enclosed seed rate calculator disc to determine the correct gearbox setting.

Refer **Use of Seed Rate Calculator** Page 25.

Suggestion: To be on the safe side and until confidence has been gained with the method of calibration it is advisable to conduct a second test at the newly determined gearbox setting.

- 11 Where a coated seed is used it is advisable to check the calibration after 1 hectare as dressings can tend to create a coating on the seed metering wheels thus changing the the flowing properties of the seed which in turn alters the seed rate.

For $\frac{1}{40}$ Hectare (250m²) Calibration
Seed Rate = Actual Seed Collected (kg) x 40

Table 6

For $\frac{1}{10}$ Hectare (1000m²) Calibration
Seed Rate = Actual Seed Collected (kg) x 10

Table 7

Basic Calibration Procedure (Continued)

Use of Seed Rate Calculator

Determining the gear box scale setting using the calculator.

Usually the first calibration test yields a different seed rate. However with the value determined from the first test it is possible to determine the correct gearbox setting with the aid of the enclosed disc calculator (Fig 13). The disc calculator consists of 3 scales. An outer white scale (1) for all seed rates above 30 kg/ha and an inner scale (2) for all seed rates below 30 kg/ha. On the middle coloured scale (3) are all the gearbox setting numbers to a maximum value of 100.

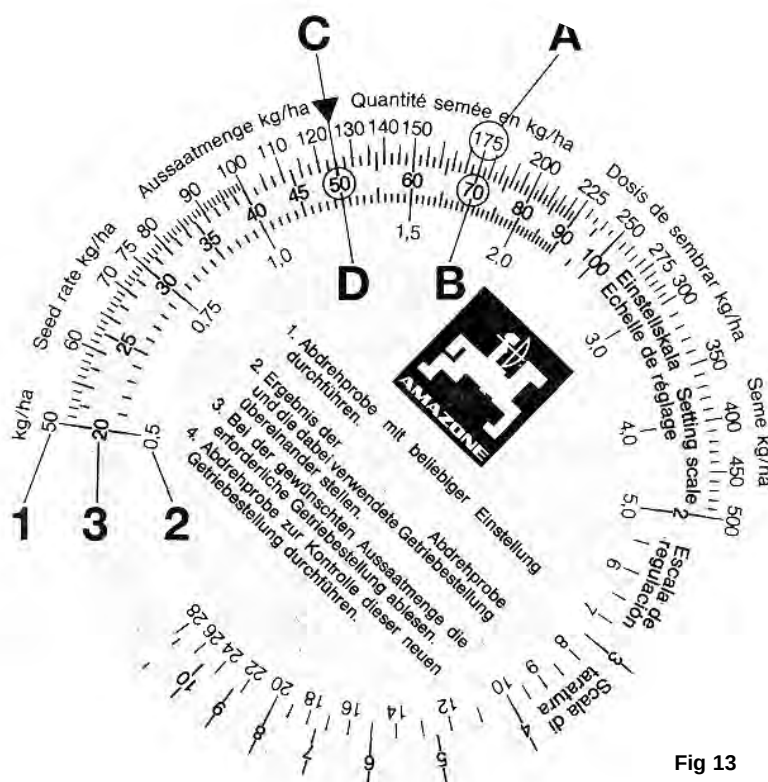


Fig 13

Setting Example (Desired Seed Rate 125kg/ha)

- 1 From the calibration procedure at a gearbox lever setting of "70", a seed rate of 175 kg/ha is obtained.
- 2 Turn the inner disc until the measured seed rate of 175kg/ha (A) is in line with the related actual gearbox setting of "70"(B) (Fig 13).
- 3 Read off from the disc rule the necessary gearbox setting for the required seed rate of 125kg/ha (C). In this example the correct setting is "50" (D) (Fig 13).
- 4 To be on the safe side the new gearbox setting can be checked by another calibration test.

Basic Calibration Procedure (Continued)

Calibration Deviations

Deviations Between the Calibration Test and the Actual Seed Rate

The most frequent cause for changes between the calibration test and the seed rate lies in the flowing properties of seed during sowing. These changes in properties generally result from reactions of the dressing agents to temperature, humidity or abrasion. These changes will become even more obvious when the bottom flaps are incorrectly set. If the setting of these flaps leaves too large a gap an uncontrollable additional flow of seed can occur during seeding; especially when assisted by the drill bouncing, a condition not simulated while conducting the calibration tests. For this reason the basic setting of the bottom flaps should be checked at regular intervals.

Residues from the seed dressing on the bottom flaps and metering wheels can also influence the flowing properties of the seed and thus the seed rate. In such cases a balance will occur only after a period of time and it is recommended to repeat the calibration test to confirm the seed rate after 2-3 seedbox fillings, nominally when the seed box is half empty. Only then will a balance occur and the seed rate will stabilise.

Wheel Slip Deviations

It is always possible with rubber tyred drills in extreme ground conditions to get wheel slip. Not normally a problem with cleated type tyres in good condition, but more so in the arable situation with the less aggressive tread patterns. The result: large differences between the calibration test and the actual sowing rate, obviously less seed deposited than required. The number of crank turns indicated below is correct in most circumstances other than those mentioned above.

To check number of crank turns for calibration

Should you require to check this in a practical way proceed as follows:

For an area of 250m² (1/40 Hectare), the travel distance for your machine is shown below. Place the crank handle over the hexagonal drive dog on the gearbox. Move the machine forward over the measured distance, counting the number of turns of the crank handle as you go. Using this number of crank turns repeat the calibration.

Machine Size	Travel Distance (m)	Turns for 1/40 Hectare	Sowing Width (m)
16 Run	86.8	32	2.88
20 Run	69.4	25	3.60
21 Run	80.7	29.5	3.10
24 Run	70.6	26	3.54
24 Run	83.3	30.5	3.00
28 Run	71.4	26	3.50

Hints for Sowing with Variable Speed Gearbox

The gearbox allows for stepless changes in the speed of the metering shaft and thus the seed rates. Due to the variations in seed type and application rates there are two speed ranges available.

By changing from High Speed to Low Speed the range of settings and control is dramatically increased.

Change to the Low Speed when the gearbox setting is down to 10 on the scale and the desired seed rate cannot be obtained.

To change the speed setting from high to low, remove the wing nut (1) and chain cover (2) (Fig 14).

Release the tension on the chain (1) by forcing back the chain tensioner (2) and hold in place with the hook. Refer Figure 15. Remove the chain from the 21 tooth output sprocket to the 13 tooth sprocket, then remove the chain from the 13 tooth gearbox sprocket to the 21 tooth. Check the chain is correctly aligned then release the chain tensioner. Ensure the tension roller is correctly aligned with the chain. Replace guard and calibrate as required.

To Determine the Gearbox Setting after a Speed Change

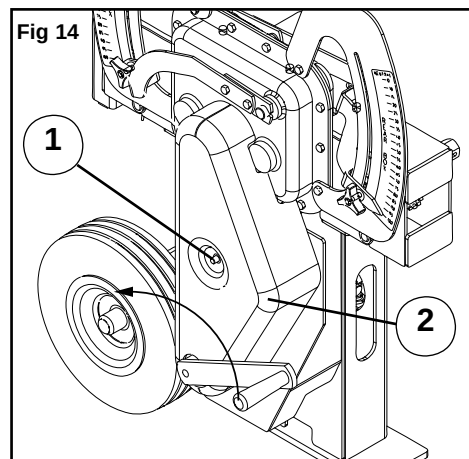
For determining the correct gearbox setting after the speed change, conduct the first test at 50. With the weight of seed collected find your correct setting with the aid of the disc calculator; refer Page 25, Fig 13.

Sowing of Fine Seeds

For sowing small seeds the Renovator Drill is equipped as standard with a combined normal and small seed metering wheel (1). During grain sowing and other larger varieties of seed both the large and small seed metering wheels are coupled and both rotate. In order to convert the seed drill to sow fine seed insert the crank handle and rotate clockwise until the holes (2) of the small seed wheel are visible (Fig 16)

Using the tool supplied (3) disengage the pin inside the hole so that the large metering wheel rotates freely on the metering shaft.

When seed is to be sown again using the normal metering wheel press the pin, from the large metering wheel side (opposite direction to before), using the tool, back into the hole of the small seed wheel thus reconnecting the drive between the two.



Low Speed Shown

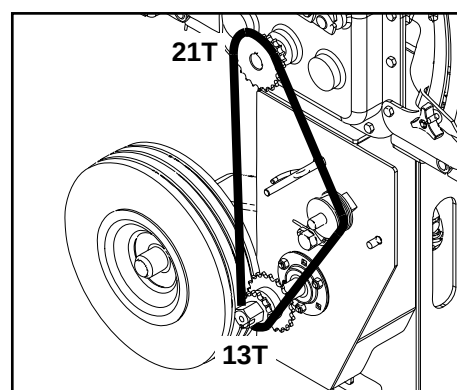


Fig 15

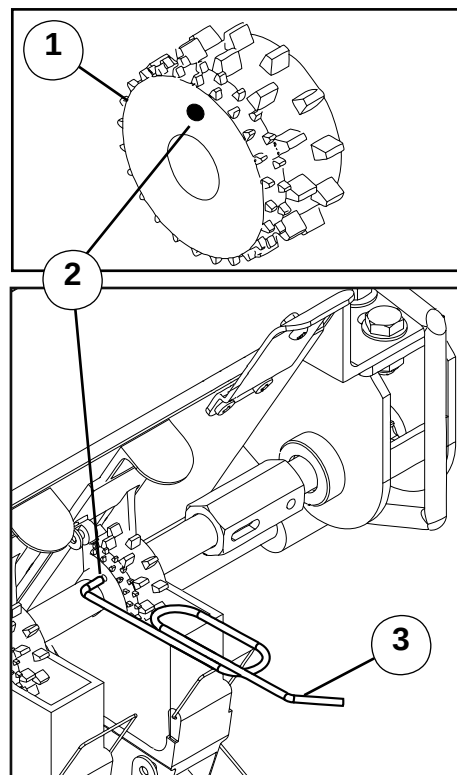


Fig 16

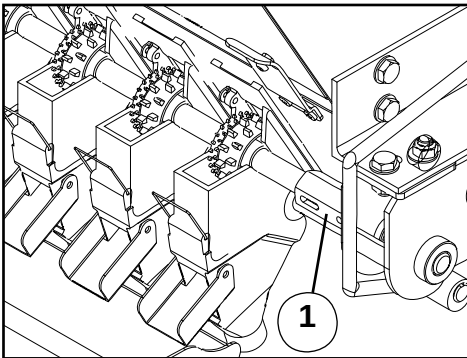


Fig 18

Small Seeds

Calibration with Disconnected Agitator Shaft

The small seed metering wheel used in Duncan Drills is especially well suited for sowing small seeds such as rape, turnips and clover.

Due to the intensive action caused by the agitator the seeds can adhere to each other, or be damaged, causing irregular sowing/germination. **Therefore it is recommended that when sowing small seeds, especially oil seeds and thin shelled seeds, the drive to the agitator is disconnected.** To do this remove the linch pin or bolt. (1) (Fig 18).

Deviations between the calibrated and actual seed rate can occur when residual dressing agent sticks to the bottom flaps and thus slows the flow of seed. Before beginning the actual calibration test fill the calibration trays by turning the crank handle at a high speed around the 90 setting on the gearbox scale. This will cause an immediate buildup of the dressing agent on the flaps. Return the contents of the calibration trays to the seed box and proceed with the actual calibration. Due to the residue buildup on the flaps your calibration will now reflect accurately the required seed rate.

Note - Remember to reconnect the agitator shaft as required for other seeds otherwise the consistency of seed rate will be affected.

Sowing Peas

Peas having the size and shape as illustrated in Fig 19A (e.g. White Field Peas), can be sown in all Duncan Drills with this type of metering wheel.

The flap should be set to a gap of at least "3" on the flap setting lever (Page 22, Fig 9).

With these peas it should not be necessary to run the agitator shaft.

Peas having the size and shape as illustrated in Fig 19B (e.g. Green or Garden Peas), tend to bridge inside the seedbox and do not flow freely.

This multi-faceted pea requires agitation for sowing.

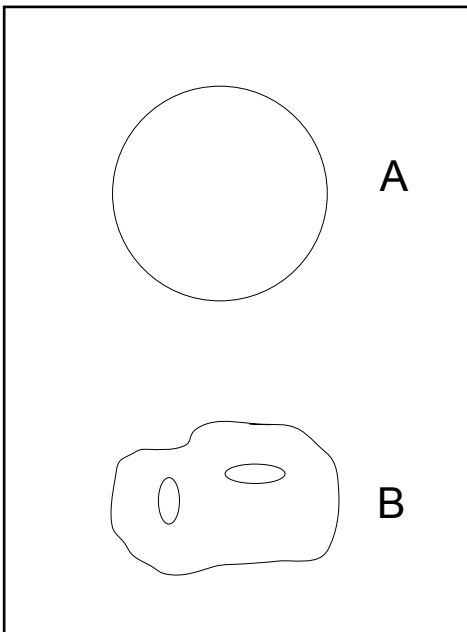


Fig 19



Caution - When resetting the metering wheels on the seeder shaft

Care should be taken when tightening the grub screws on the small seed wheel. Adjust the grub screw until the movement of the metering wheel just stops, then tighten no more than 1/8 of a turn.

Do not overtighten as this can result in breakages while operating and may render the warranty on these units void.

Hectaremeter Settings Setup

Refer to the operation instructions supplied with your hectaremeter kit for information and operation thereof. (Fig 21).

Computronics 1100 Area Meter Setup for Mk4 Renovator

The **H1** value is the **distance the machine travels in mm per pulse detected on the pedestal drive shaft**.

This is affected by:-

- jockey wheel diameter
- if there is wheel slip
- the gear ratio (13T on the jockey axle and 38T on the sensor mainshaft).

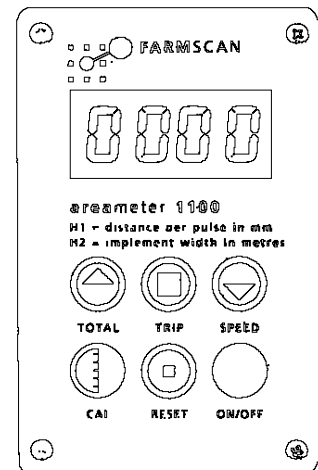


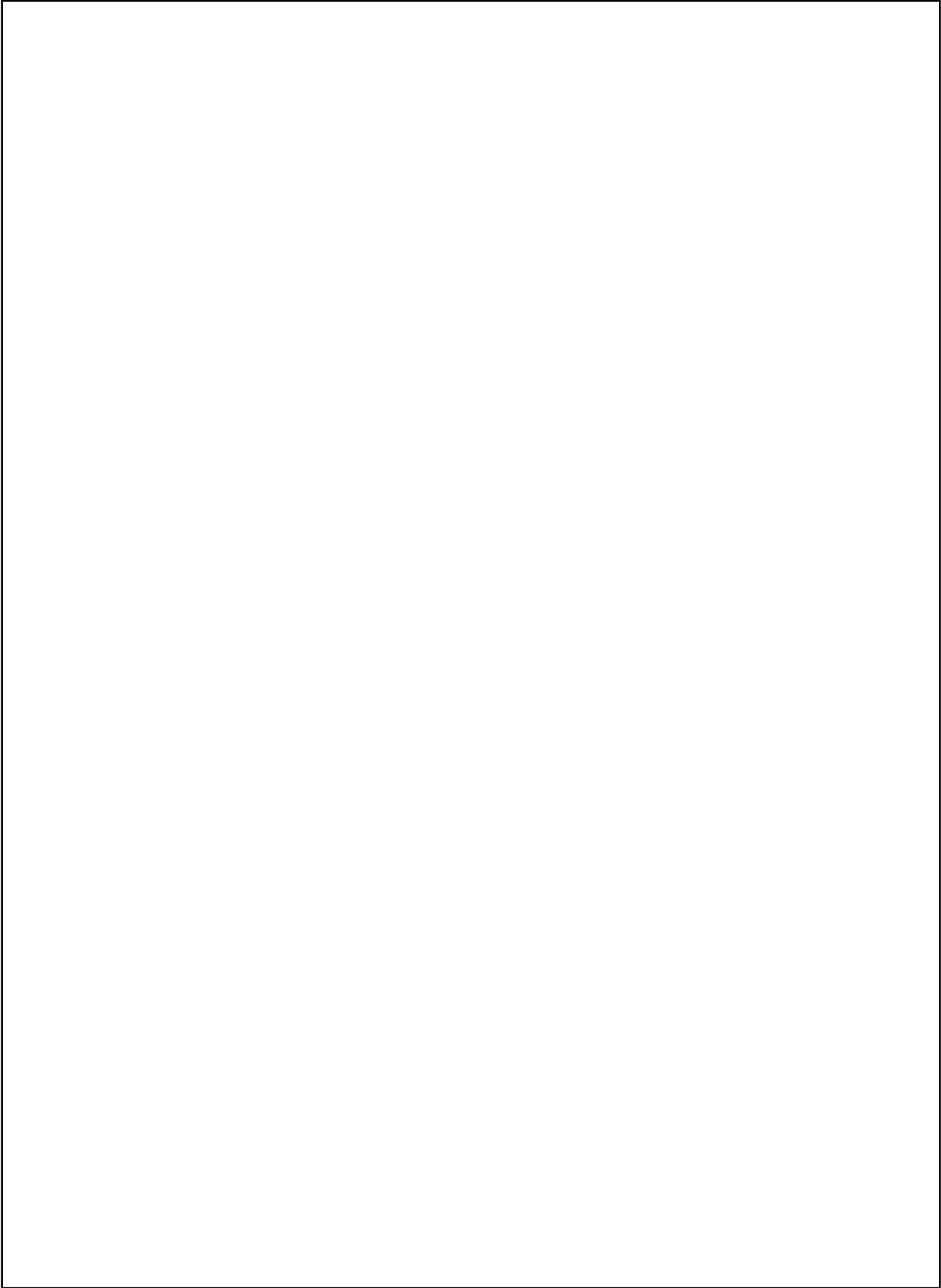
Fig 21

Ensure that the jockey wheel is inflated to the recommended pressure. (Page 5)

The **H2** value is calculated from the **number of rows x row spacing** (in metres)

Machine Size	Row Spacing(mm)	H1	H2
16 Run	180	2750	2.88
20 Run	180		3.60
21 Run	147.5		3.10
24 Run	147.5		3.54
24 Run	125		3.00
28 Run	125		3.50
Enter your value here>		2750	
		H1	H2

It is advisable, as with all things electronic, to have a backup of your totals. We suggest you record these on a daily basis in a notebook or diary.



[illegible]

Maintenance & Care

General Safety and Accident Prevention Advice



- 1 Make sure that if the tractor remains attached to the drill that the ignition key is removed.
- 2 During maintenance the drill should be supported in such a manner that if hydraulic failure was to occur the machine would still be adequately supported.
- 3 Wear gloves when handling components with cutting edges such as worn discs etc...
- 4 Disconnect the electrical supply from the tractor before doing any electrical maintenance.
- 5 Refer to safety sections for more safety information.

General Cautionary Maintenance Advice



- 1 **Electric Welding** - With the electronic equipment in modern tractors it is advisable to completely disconnect the implement from the tractor, or at the very least disconnect the alternator before attempting any welding.
- 2 **Hydraulics** - Ensure hydraulic couplings (male & female) are clean before connecting. Dirty couplings will result in hydraulic oil contamination and hydraulic cylinder seal/poppet valve damage and bore scores. This in turn will result in oil leakage past the piston seals.

No filter is fitted to the hydraulic system. If hydraulic fittings and oil supply are not going to be kept clean it is recommended that a filter be fitted to prevent hydraulic cylinder damage.
- 3 **Water Blasting** - Water blasting, steam cleaning or other pressurised cleaning processes can force dirt etc. into undesirable places that may cause damage or rapid part wear to items such as bearings, seals, chains, bushes etc. Caution must be exercised.

Maintenance & Care - Lubrication Instructions

Precautions with Grease

Greases should not be mixed as the structure may be weakened by the mixes of different types of thickener, which may cause softening and loss of grease from the bearings by running out.



Your new Duncan Renovator Seed Drill will give long and efficient service if given normal care and maintained properly.

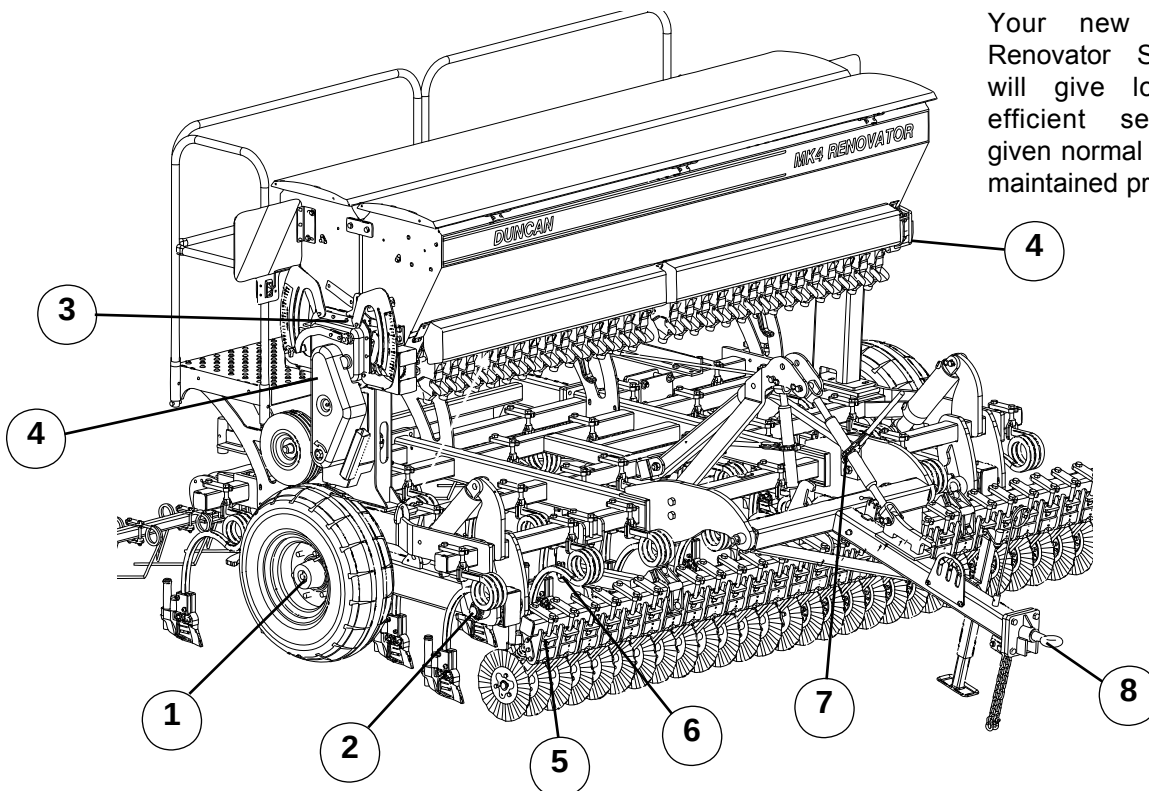


Fig 22

Lubrication Chart

Item	Components	Lubricant	Frequency
1	Wheel Bearings	Castrol LMX Grease	Annually
2	Wheel Leg Pivots	Castrol LMX Grease	Weekly
3	Gearbox	Castrol Oil Agri Trans Plus	Maintain Level
4	Drive Chains	Suitable Roller Chain Lubricant	See Maintenance Schedule
5	Disc Arm Castings	Castrol LMX Grease	Daily
6	Disc Opener Fr. Pivots	Castrol LMX Grease	Monthly
7	Turnbuckles	Castrol LMX Grease	Monthly
8	Coupling	Castrol LMX Grease	Weekly

* The lubrication frequencies are only a guide. Actual frequency will be dependent on extent of use and ground conditions.

Maintenance & Care - Lubrication Instructions

Table 10

Components	Daily (or after 20Ha)	Weekly (or after 75Ha)	Pre Season (or 500 Ha)
Disc Openers	•	•	•
Depth Adjustment Collar	•	•	•
Seeders/Agitators/Bottom Flaps	•	•	•
Wheel Nuts	•	•	•
Pivot Pin Fasteners		•	•
Coupling & Safety Chains		•	•
Roller Chains		•	•
Gearbox		•	•
Hydraulics (Oil Leaks)		•	•
Tyre Pressures (58psi /4.0 bar)		•	•
Bolted Connections			•

Maintenance Schedule

(Refer also to Summary Chart, above)

1 Bolted Connections

All bolted connections of the machine should be checked after the first 3 to 5 hours of operation and retightened if necessary and thereafter at regular intervals. It is suggested that this is done every 500 hectares or annually, whichever occurs first.

2 Gearbox

The oil level in the gearbox can be seen in the oil gauge window. Changing the gearbox oil is recommended once a year or sooner if the oil is discoloured. For refilling the oil remove the 1/2" BSP plug on the top face of the gearbox, Castrol Oil Agri Trans Plus or equivalent* should be used. The total filling capacity is 1.25 litres.

DO NOT OVERFILL.

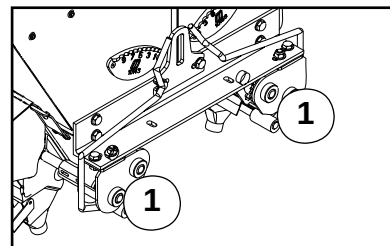
**Oil Specification to meet the requirements of : SAE 10W-30, API GL-4, Massey Ferguson M1143, John Deere J20C, J20D, Case MS 1207, Ford/New Holland M2C-134D, M2C-86 A/B/C*

3 Drive Chains

All drive chains (1) (Fig 25) should first be checked after every 20 hours of operation and thereafter weekly or after 75Ha of operation as follows:-

The metering wheels of the seed drill are driven via roller chains from the drive wheel.

Cleaning of the roller chains is recommended after long periods of operation. Remove the chain, wash in kerosene and then dip them in heated grease or oil or spray them with a suitable commercial roller chain lubricant.



4 Wheel Arm Pivots

Wheel arm pivots must be greased regularly (weekly or after every 75Ha) to provide lubrication and flush out any dirt. Refer Fig 26 (1).

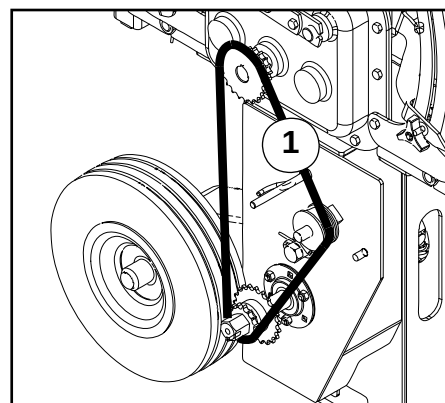


Fig 25

5. Depth Adjustment Collar

Grease the depth adjustment collar (2) regularly to ensure it does not seize up. Also check for dirt buildup around the ram shaft seals to ensure seal damage does not occur. Refer Fig 26

6. Tyre Pressure

The recommended tyre pressure is 4.0 bar (58 psi). Check the tyre pressure regularly to ensure correct pressure is maintained. Weekly checks are recommended.

7. Disc Openers

Front coulter bearings are sealed and do not require lubrication. Check discs for any lateral movement (wobble) on a regular basis. Replace bearings if there is any noticeable wobble.

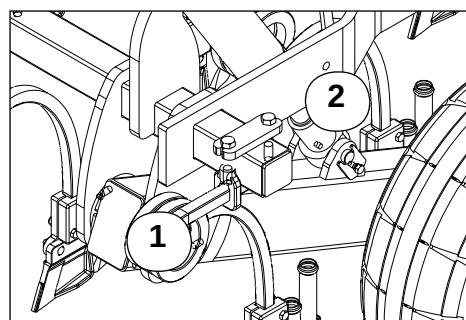


Fig 26

There is one grease nipple on each disc opener frame pivot and disc assembly casting. Frame pivots should be greased monthly while disc castings should be greased daily to provide lubrication and to flush out any dirt.

8. Length of Seed/Fertiliser Tubes

These tubes can stretch over a period of time and require checking at approximately six monthly intervals. Shorten if necessary to avoid bends which will restrict the flow of seed/fertiliser.

9 Framework

The framework structure should be inspected annually for defects, i.e., cracks in members or welded connections. The framework should be cleaned prior to the inspection.

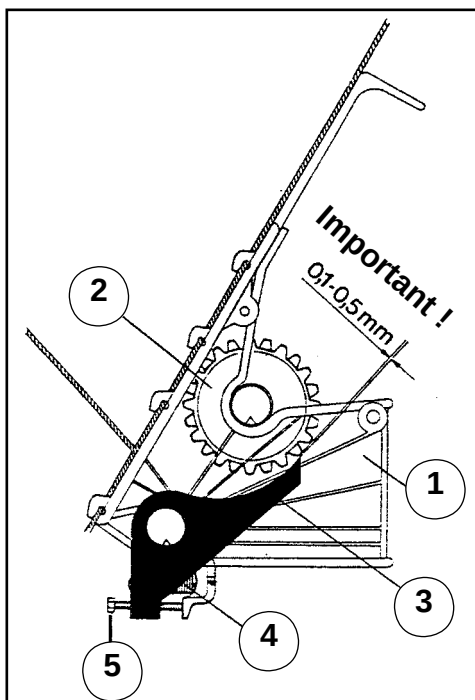


Fig 28

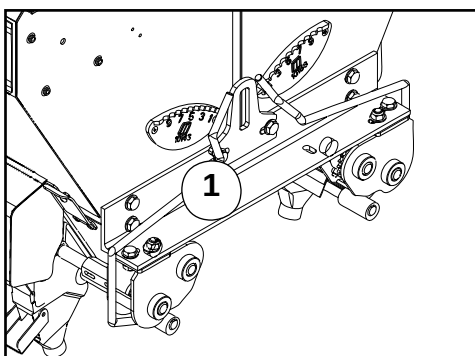


Fig 29

Maintenance & Care (Continued)

10 Bottom Flaps (Fig 28)

The required seed rate is controlled by both the metering wheels and the bottom flaps. The seed flows from the seed box into the metering wheel housings. Inside the metering wheel housing (1) the seed is caught between the metering wheel (2) and the bottom flap (3). The metered amount of seed is transported by the metering wheel to the edge of the bottom flap where it drops off into the seed guide tube which leads to the coulter. Varying grain sizes require the matching of the flap clearance to the different grain sizes. This matching is done by raising or lowering the bottom flaps by using the flap adjusting lever on the LH end of the seed box. If larger foreign particles, e.g. stones get between the metering wheel and the bottom flap, the bottom flap can give way downwards. A strong return spring (4) brings the bottom flap immediately back into the working position.

The metering system should be checked every 1/2 year or before any sowing period with an empty seed box and empty metering housings.

Use the following procedure:

Put the bottom flap setting levers (1) (located on the LH end of the seed boxes) in position "1" for the front box and position "1" for the rear box. Refer Fig 29.

By turning the metering wheel shaft by hand check the flaps are all set to a gap of 0.1 to 0.5mm (refer Fig 28). To adjust individual flaps use the spring tensioning screw (5) (Fig 28).

Note: Maintenance Schedule (page 24)

Where the frequency is given in terms of use (eg. weekly) or area covered (eg. 75 Ha) perform the maintenance task based on whichever occurs first.

Preparing the Machine for Storage.

Locate on a dry level surface. The machine should be stored wherever possible so the rams are not supporting any weight. The drive chains should be lubricated with suitable roller chain lubricant before prolonged periods of storage.

For longer term storage remove seed/fertiliser tubes from the boot assembly and allow to hang without deformation. Check tube lengths when replacing.

It is recommended that maintenance be carried out at the end of the season, giving sufficient time to obtain spare parts and/or carry out repairs if required.

Renovator Troubleshooting

Problem	Possible Cause	Action	Refer to Page...
Over Sowing	Jockey wheel under inflated	<i>Check pressure</i>	5
	Are the hectare meter settings correct?	<i>Check settings</i>	29
	Has the calibration procedure been followed correctly?	<i>Re-calibrate</i>	22-24
	Is the shutter slide open too wide?		22-24
	Is the flap setting open too wide?	<i>Check settings</i>	22-24
	Too larger gap between seeder unit & bottom flap (should be 0.3mm when on setting 1)	<i>Check settings</i>	32
	Quadrant Tri-knob coming loose	<i>Check gap</i>	18
Under Sowing	Has the calibration procedure been followed correctly?	<i>Re-calibrate</i>	22-24
	Is the correct gear ratio selected?	<i>Check setting</i>	27
	Sowing at shallow depths. Is there sufficient pressure on the jockey wheel?	<i>Check and adjust spring pressure</i>	
Drill not sowing until quadrant levers are well down on the scale/each box is sowing at different rate even when both set on the same setting	The two bolts on the quadrant lever have come loose	<i>Check and reset</i>	70-71
	Transfers may not be aligned with each other		
Drill sowing deeper on one side/leaking down on one side	Hydraulic lift rams have not rephased properly	<i>Rephase rams</i>	38
	Dirt in the poppet valve of the ram	<i>Clean/replace valve</i>	38
Tines are moving	Too much turning with drill in the ground	<i>Keep turning to minimum</i>	
Drill not penetrating into ground/drill riding out of ground	Operating drill in the float position	<i>Do not operate in float</i>	15
	Disc openers are keeping the drill from penetrating into the ground	<i>Lift discs out of the ground</i>	16

Commisioning PTE Phasing Cylinders

1. General

(a) PTE cylinders will re-phase in both directions. Each piston is fitted with 2 poppet valves which open at the end of the stroke to allow oil to bypass the piston. The bypass of oil at the end of the stroke allows for initial bleeding of the system and re-phasing in operation.

(b) The valve in the piston is a precision device, **CLEANLINESS IS OF THE UTMOST IMPORTANCE**. Contamination in the oil will accelerate deterioration of the valve seat. Cylinders will creep once the integrity of the seating is lost.

2. Bleeding the System

(a) Initial bleeding after connection to the tractor

Purge all air from the system by fully stroking rams in both directions. Allow the oil to flow through the cylinders with the tractor at an idle for a minimum of 2 minutes at each end of the stroke.

(b) Re-phasing after initial bleeding

After initial bleeding the cylinders will only require occasional re-phasing during operation. This is done by extending the rams for about 30 seconds or until all cylinders have reached the end of their stroke.

3. Fault Finding

1. Cylinders creeping during operation

There are two primary causes of this:

- (i) Air in the hydraulic system
- (ii) By passing of the poppet valve.

(a) Check that there is no air in the system. Raise and lower the machine. All cylinders should move instantaneously, any lag indicates that there is air in the system. Other signs of air in the system are hoses vibrating/squealing or the control handle shuddering. Re-bleed the system if necessary.

(b) If there is no sign of air in the system and the cylinders still creep, raise the machine off the depth stop and measure the movement of each cylinder rod.

(c) If both cylinders move at the same rate it is likely to be the control valve/lock out valve that is leaking.

(d) If the slave continues moving after the master cylinder has hit the depth stop it is likely to be the piston in the master cylinder that is bypassing.

(e) If the slave cylinder extends while the master cylinder retracts it is likely to be the piston in the master cylinder that is bypassing.

(f) If the master cylinder does not move but the slave does it is likely to be the piston in the slave cylinder that is bypassing.

(g) If the piston is bypassing it is likely to be contamination in the phasing valve. The cylinder will have to be dismantled, cleaned and fitted with a new poppet valve.

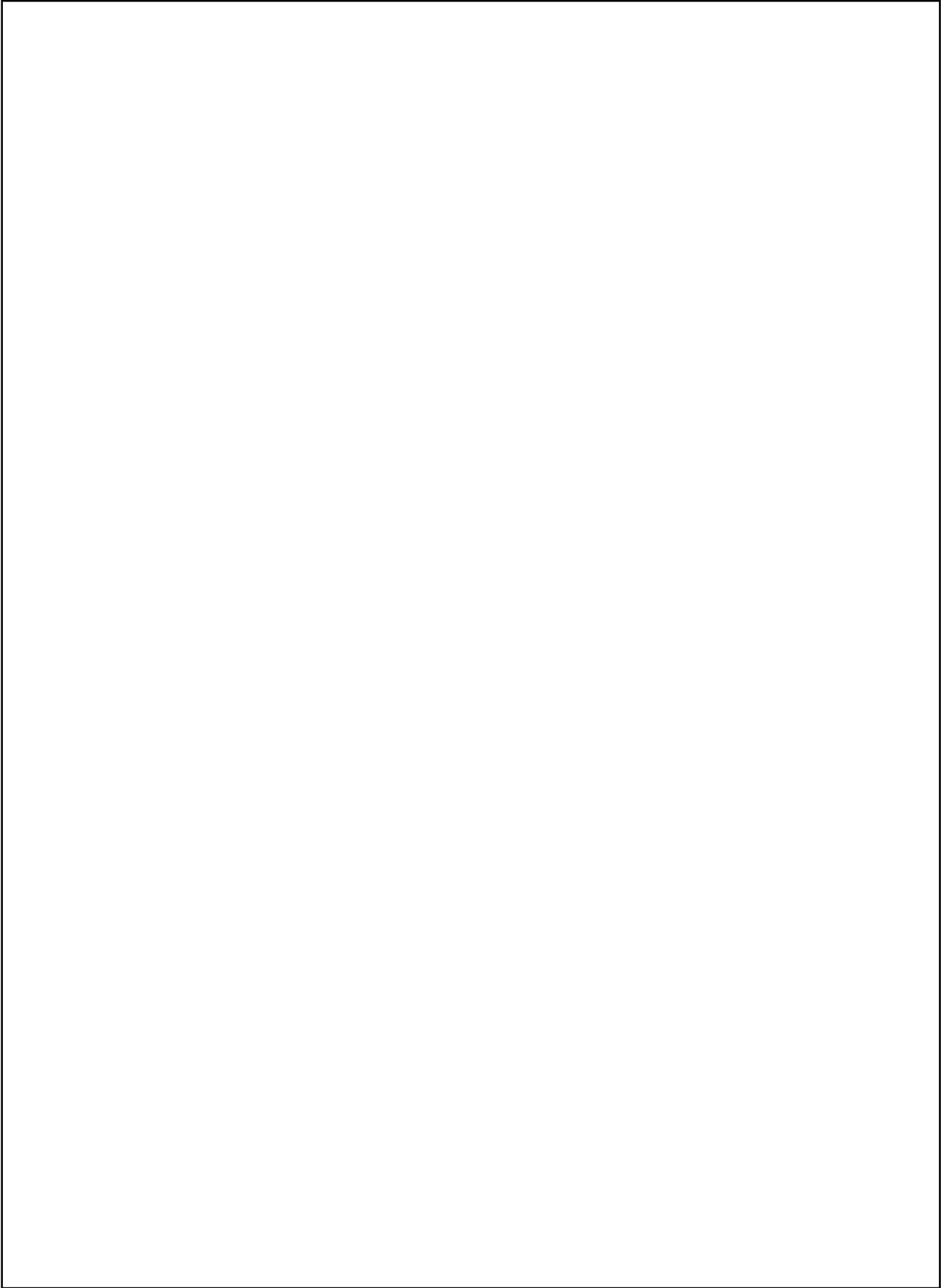
Commisioning PTE Phasing Cylinders (continued)

3. Fault Finding (continued)

2. Cylinders moving at different rates

(a) Check that there is no air in the system. Raise and lower the machine; all cylinders should move at the same time, any lag indicates that there is air in the system. Re-bleed the system if necessary.

(b) Ensure that the cylinders have been connected correctly. The cylinders should be connected in series so that the bore sizes go down in 1/4" increments. The Rod end port of the master cylinder (3.5" bore) is connected to the piston end port of the slave cylinder (3.25" bore).



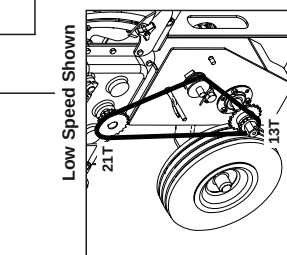
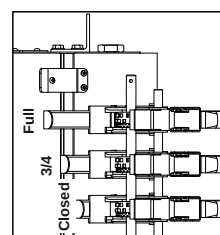


Renovator Seed Drill Sowing Chart

High & Low Ratio - Wide Row Spacing 180mm

PRODUCT	Shutter				Bottom Flap*	Metering Wheel*	Seed Rate (kg/ha)										Agitator Shaft	
	Slide*		Position	Type			Gearbox Setting Position											
	Hi/Low						15	20	30	40	50	60	70	80	90	100		
Wheat	H		3/4	3	N						84	105	125	148	170	192	Connected	
Oats	H		Full	3	N							81	101	120	141	161	180	Connected
Barley	H		Full	3	N							97	119	144	168	194	218	Connected
Ryecorn	H		3/4	3	N							98	121	146	170	197	221	Connected
White Peas	H		3/4	3	N				92	133	175	202	250	294	325	374	Disconnected	
Green Peas	H		3/4	3	N				64	96	128	157	189	224	259	292	Connected	
Perenn. Grass	H		Full	3	N	5.3	11	22	34	44	55	66					Connected	
Annual Grass	H		Full	3	N	6.6	13	26	38	50	63						Connected	
Pasture Mix*	H		Full	3	N		11	22	34	44	55	66					Connected	
Lucerne	H		3/4	1	F			7.4	11	15	18	21					Disconnected	
Turnip	L		3/4	1	F	0.8	1.5	2.6	3.8	4.9							Disconnected	
Kale	L		3/4	1	F		1.4	2.6	3.9	4.9							Disconnected	
Swedes	L		3/4	1	F	0.8	1.3										Disconnected	
Rape	L		3/4	1	F		1.3	2.5	3.6	4.8							Disconnected	
White Clover	L		3/4	1	F	0.7	1.3	2.5	3.7	4.6							Disconnected	
Red Clover	L		3/4	1	F		1.6	2.9	4.1	5.5	6.7	8.0					Disconnected	
Super Phosphate	H		Full	3	N		75	115	152	193	235	282	325	374			Connected	
DAP Granules	H		Full	3	N					143	175	211	247	284	314		Connected	
Super Phosphate	L		Full	3	N					44	58	74	90	108	125	150	Connected	
DAP Granules	L		Full	3	N							95	109	120			Connected	

Metering Wheel* N=Normal (Both)
F= Fine (Small)



Hectaremeter Settings

Machine Size	Row Spacing(mm)	H1	H2
16 Run	180		2.88
20 Run	180	2750	3.60

Basic Calibration Procedure

Seed Calibration

The calibration test should be done to confirm the required seed rate and is done with the drill stationary and level.

Seed Calibration Procedures

- Place the calibration tray in the brackets
- Position all the clear plastic seed diverters to redirect the seed into the calibration tray
- Select gear ratio
- Set Shutter Slide
- Set Bottom Flap
- Disconnect/connect Agitator Shaft
- Select gearbox setting
- Place the crank handle over the hex drive and turn anti-clockwise until the seed flows consistently from all seeder units then empty into the seedbox.
- Turn the crank handle anti-clockwise the required number of revolutions.

Machine Size	Row Spacing(mm)	Sowing Width (m)	Turns for 1/10 Hectare	Turns for 1/10 Hectare
16 Run	180	2.88	32	127
20 Run	180	3.60	25	101

- Weight seed (scales must be accurate to within 2 grams)

For 1/10 Hectare
Seed Rate = Actual Seed Collected (kg) x 40

For 1/10 Hectare
Seed Rate = Actual Seed Collected (kg) x 10

HANDY HINTS

Keep a constant pace during calibration turns
For seed rates under 30kg/Ha >use LOW RATIO
Bottom Flap: check gap setting (0.3mm) regularly to avoid inconsistent seeding and or seed damage. REFER TO MANUAL
For products not on sowing chart choose a similar product
For accurate seeding, ensure jockey wheel is inflated to maximum pressure shown on the tyre wall
Keep turning in ground to a minimum
When fitted, disc opener should run approx 20mm deeper than boot



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PIN 45658

Seed rates shown are approximate only for the respective gearbox setting. It is recommended that the calibration procedure is always used.



Renovator Seed Drill Sowing Chart

High & Low Ratio - Narrow Row Spacing 125mm

PRODUCT	Shutter Slide*		Bottom Flap*	Metering Wheel*	Seed Rate (kg/ha)										Agitator Shaft
	Hi/Low	Position	Type		15	20	30	40	50	60	70	80	90	100	
Wheat	H	3/4	3	N					121	152	180	213	246	277	Connected
Oats	H	Full	3	N					117	146	173	204	233	260	Connected
Barley	H	Full	3	N					140	172	208	243	281	315	Connected
Ryecom	H	3/4	3	N					141	175	211	245	285	320	Connected
White Peas	H	3/4	3	N			133	192	252	291	361	425	470	541	Disconnected
Green Peas	H	3/4	3	N			92	139	185	227	274	323	374	422	Connected
Perenn. Grass	H	Full	3	N	7.7	17	32	49	64	79	96				Connected
Annual Grass	H	Full	3	N	10	19	38	55	72	91					Connected
Pasture Mix*	H	Full	3	N		17	32	49	64	79	96				Connected
Lucerne	H	3/4	1	F		11	17	21	26	31					Disconnected
Turnip	L	3/4	1	F	1.2	2.1	3.8	5.4	7.1						Disconnected
Kale	L	3/4	1	F		2.0	3.8	5.6	7.1						Disconnected
Swedes	L	3/4	1	F	1.2	1.9									Disconnected
Rape	L	3/4	1	F		1.9	3.6	5.2	6.9						Disconnected
White Clover	L	3/4	1	F	0.9	1.9	3.7	5.3	6.6						Disconnected
Red Clover	L	3/4	1	F		2.2	4.2	5.9	7.9	10	12				Disconnected
Super Phosphate	H	Full	3	N			108	166	219	278	340	407	470	541	Connected
DAP Granules	H	Full	3	N					206	253	304	358	410	453	Connected

125

Basic Calibration Procedure

Seed Calibration

The calibration test should be done to confirm the required seed rate and is done with the drill stationary and level.

Seed Calibration Procedures

- 1 Place the calibration tray in the brackets
- 2 Position all the clear plastic seed diverters to redirect the seed into the calibration tray
- 3 Select gear ratio
- 4 Set Shutter Slide
- 5 Set Bottom Flap
- 6 Disconnect/connect Agitator Shaft
- 7 Select gearbox setting
- 8 Place the crank handle over the hex drive and turn anti-clockwise until the seed flows consistently from all seeder units then empty into the seedbox.
- 9 Turn the crank handle anti-clockwise the required number of revolutions.

Machine Size	Row Spacing(mm)	Sowing Width (m)	Turns for 1/10 Hectare	Turns for 1/10 Hectare
24 Run	125	3.00	30.5	122
28 Run	125	3.50	26	104

10 Weigh seed (scales must be accurate to within 2 grams)

11

For $\frac{1}{10}$ Hectare
Seed Rate = Actual Seed Collected (kg) x 40

For $\frac{1}{10}$ Hectare
Seed Rate = Actual Seed Collected (kg) x 10

HANDY HINTS

Keep a constant pace during calibration turns

For seed rates under 30kg/Ha >use LOW RATIO

Bottom Flap: check gap setting (0.3mm) regularly to avoid inconsistent seeding and or seed damage. REFER TO MANUAL

For products not on sowing chart choose a similar product

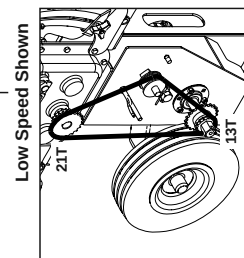
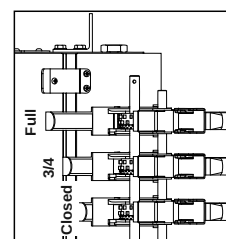
For accurate seeding, ensure jockey wheel is inflated to maximum pressure shown on the tyrewall

Keep turning in ground to a minimum

When fitted, disc opener should run approx 20mm deeper than boot

Hectaremeter Settings

Machine Size	Row Spacing(mm)	H1	H2
24 Run	125	2750	3.00
28 Run	125		3.50



Seed rates shown are approximate only for the respective gearbox setting. It is recommended that the calibration procedure is always used.



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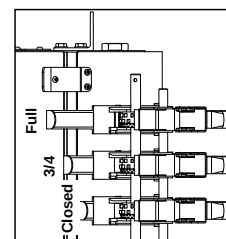


Renovator Seed Drill Sowing Chart

High & Low Ratio - Standard Row Spacing 147.5mm

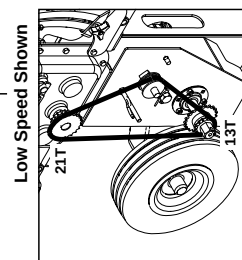
PRODUCT	Shutter*		Bottom Flap*	Metering Wheel*	Seed Rate (kg/ha)										Gearbox		Agitator Shaft
	Hi/Low	Position			Type	Setting Position											
						15	20	30	40	50	60	70	80	90	100		
Wheat	H	3/4	3	N					102	128	152	180	208	234	Connected		
Oats	H	Full	3	N					99	123	146	172	197	220	Connected		
Barley	H	Full	3	N					118	145	176	205	237	266	Connected		
Ryegrass	H	3/4	3	N					119	148	178	207	241	270	Connected		
White Peas	H	3/4	3	N				112	162	213	246	305	397	457	Disconnected		
Green Peas	H	3/4	3	N				78	117	156	192	231	273	316	356	Connected	
Perenn. Grass	H	Full	3	N	6.5	14	27	41	54	67	81				Connected		
Annual Grass	H	Full	3	N	8.1	16	32	46	61	77					Connected		
Pasture Mix*	H	Full	3	N		14	27	41	54	67	81				Connected		
Lucerne	H	3/4	1	F			9.0	14	18	22	26				Disconnected		
Turnip	L	3/4	1	F	1.0	1.8	3.2	4.6	6.0						Disconnected		
Kale	L	3/4	1	F		1.7	3.2	4.7	6.0						Disconnected		
Swedes	L	3/4	1	F	1.0	1.6									Disconnected		
Rape	L	3/4	1	F		1.6	3.0	4.4	5.8						Disconnected		
White Clover	L	3/4	1	F	0.8	1.6	3.1	4.5	5.6						Disconnected		
Red Clover	L	3/4	1	F		1.9	3.6	5.0	6.7	8.2	9.8				Disconnected		
Super Phosphate	H	Full	3	N		91	140	185	235	287	344	397	457		Connected		
DAP Granules	H	Full	3	N					174	214	257	302	346	383	Connected		
Super Phosphate	L	Full	3	N					54	71	90	110	132	152	183	Connected	
DAP Granules	L	Full	3	N								116	133	147	Connected		

Metering Wheel* N=Normal (Both)
F= Fine (Small)



Hectaremeter Settings

Machine Size	Row Spacing(mm)	H1		H2	
		21 Run	24 Run	2750	3.098
21 Run	147.5				3.098
24 Run	147.5				3.54



Basic Calibration Procedure

Seed Calibration

The calibration test should be done to confirm the required seed rate and is done with the drill stationary and level.

Seed Calibration Procedures

- Place the calibration tray in the brackets
- Position all the clear plastic seed diverters to redirect the seed into the calibration tray
- Select gear ratio
- Set Shutter Slide
- Set Bottom Flap
- Disconnect/connect Agitator Shaft
- Select gearbox setting
- Place the crank handle over the hex drive and turn anti-clockwise until the seed flows consistently from all seeder units then empty into the seedbox.
- Turn the crank handle anti-clockwise the required number of revolutions.

Machine Size	Row Spacing(mm)	Sowing Width (m)	Turns for 1/10 Hectare	Turns for 1/10 Hectare
21 Run	147.5	3.098	29.5	118
24 Run	147.5	3.54	26	103

10 Weigh seed (scales must be accurate to within 2 grams)

11

For $\frac{1}{10}$ Hectare
Seed Rate = Actual Seed Collected (kg) x 40

For $\frac{1}{10}$ Hectare
Seed Rate = Actual Seed Collected (kg) x 10

HANDY HINTS

Keep a constant pace during calibration turns

For seed rates under 30kg/ha >use LOW RATIO

Bottom Flap: check gap setting (0.3mm) regularly to avoid inconsistent seeding and or seed damage. REFER TO MANUAL

For products not on sowing chart choose a similar product

For accurate seeding, ensure jockey wheel is inflated to maximum pressure shown on the tyre wall

Keep turning in ground to a minimum

When fitted, disc opener should run approx 20mm deeper than boot

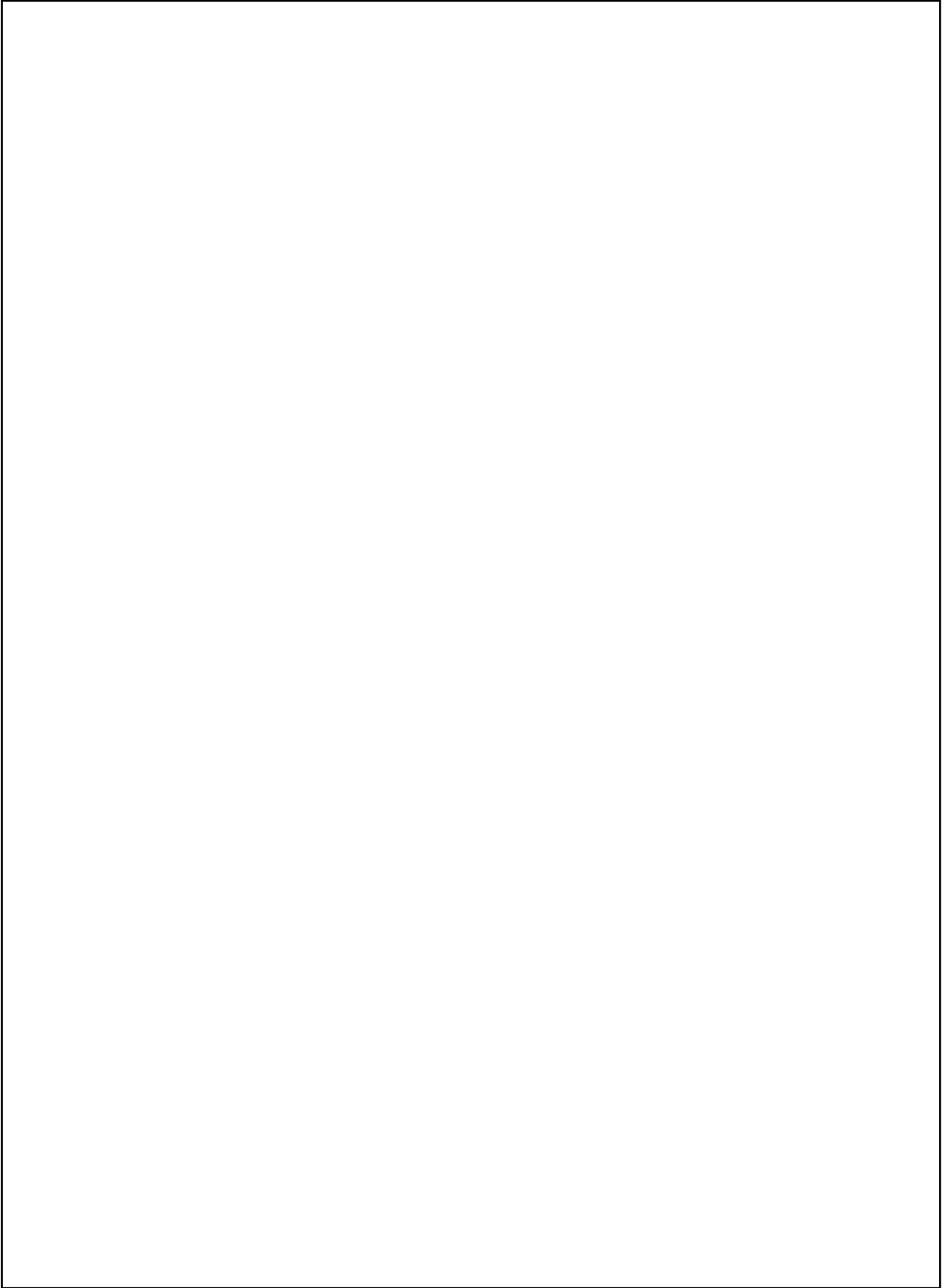


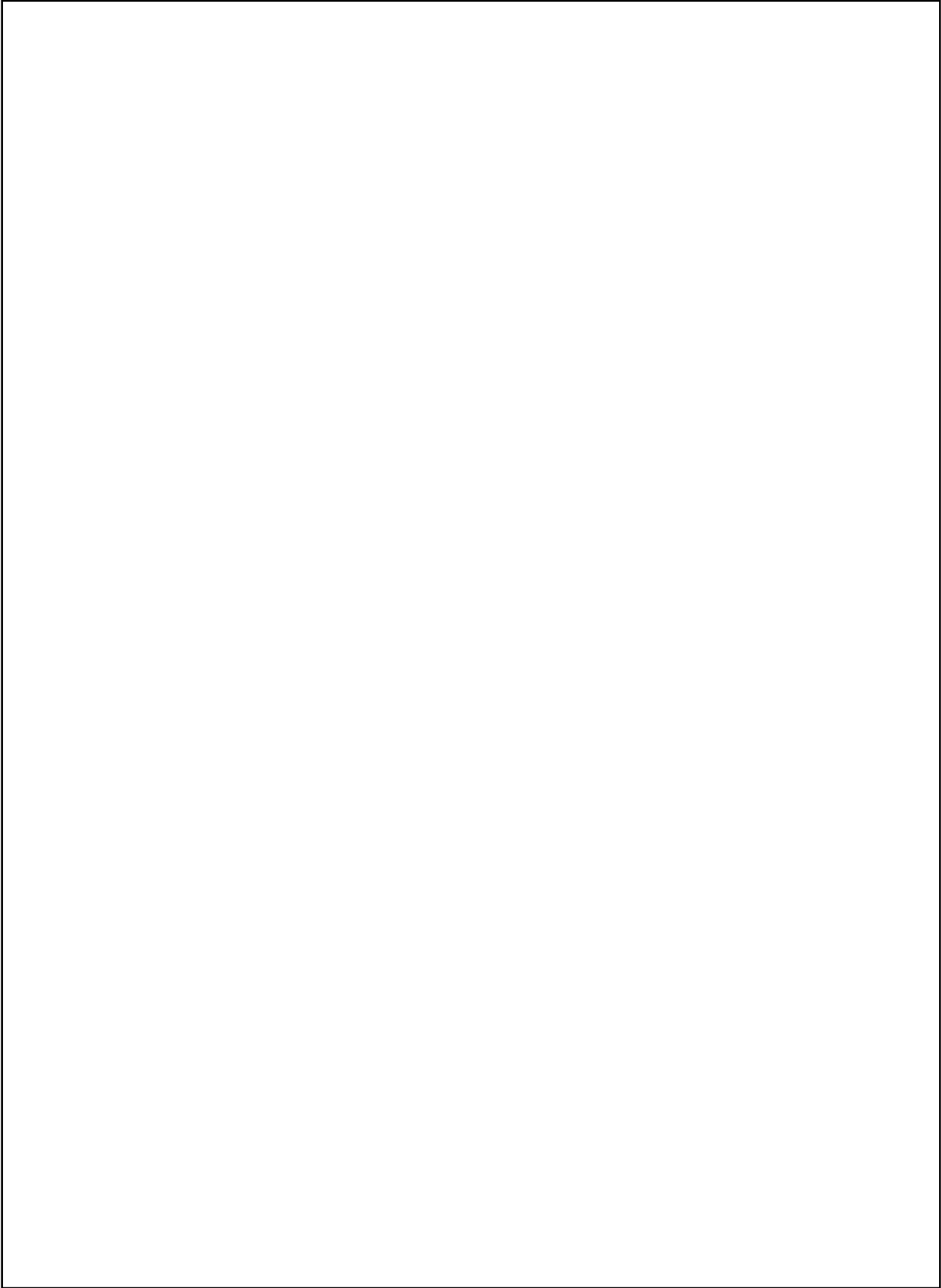
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Seed rates shown are approximate only for the respective gearbox setting. It is recommended that the calibration procedure is always used.

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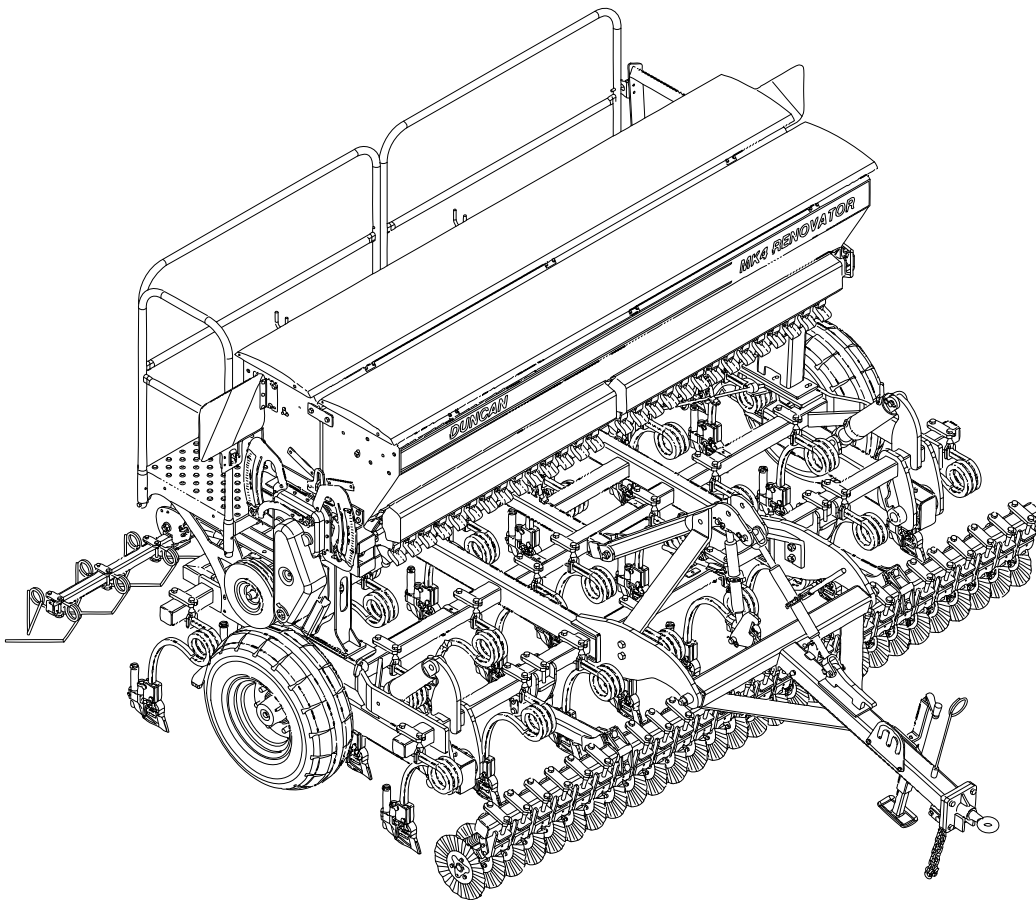




Parts List



'Mk4 Renovator' Seed Drill



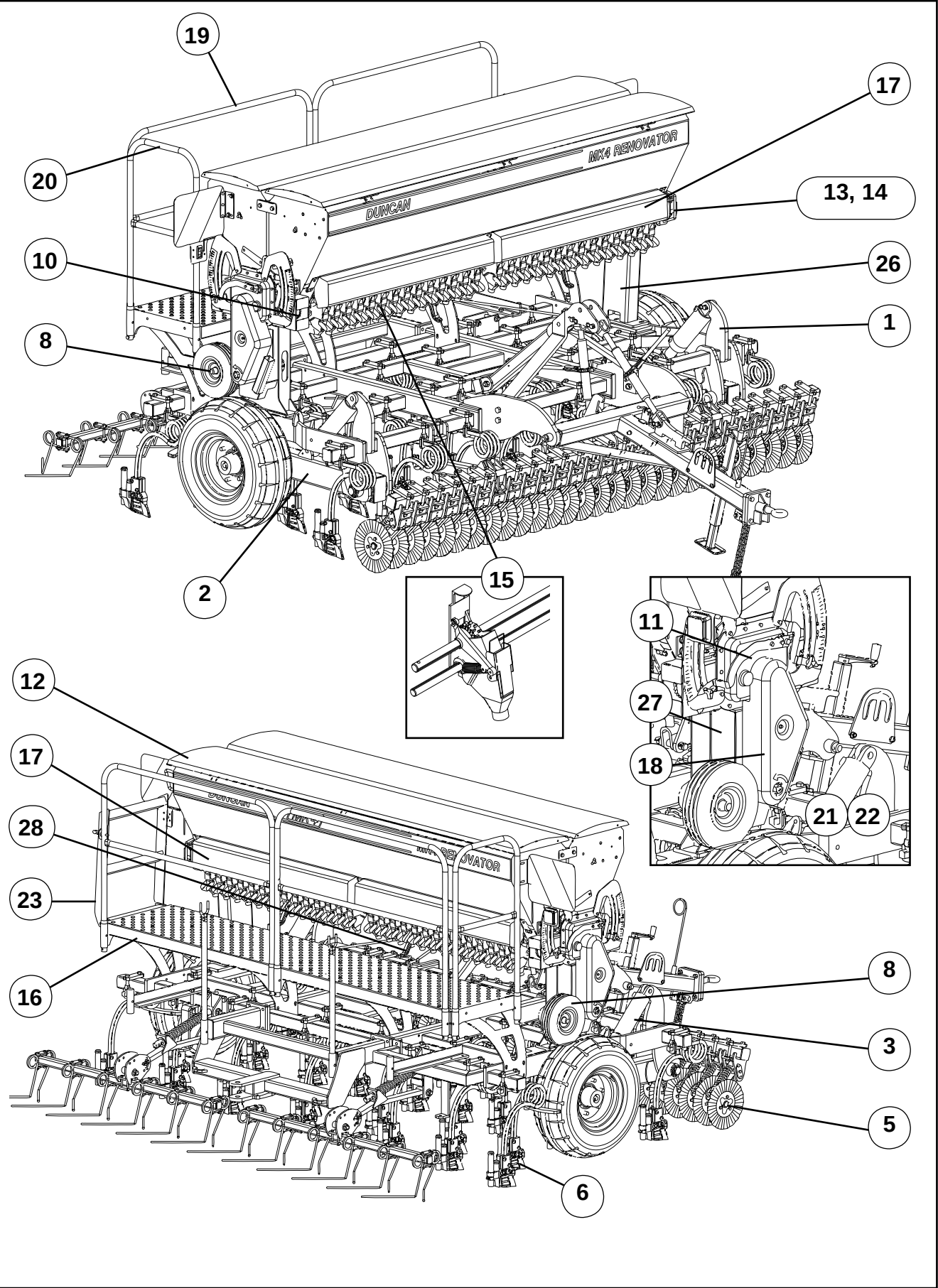
Built to work.

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**Pt. No. 67381
Issue 0511**

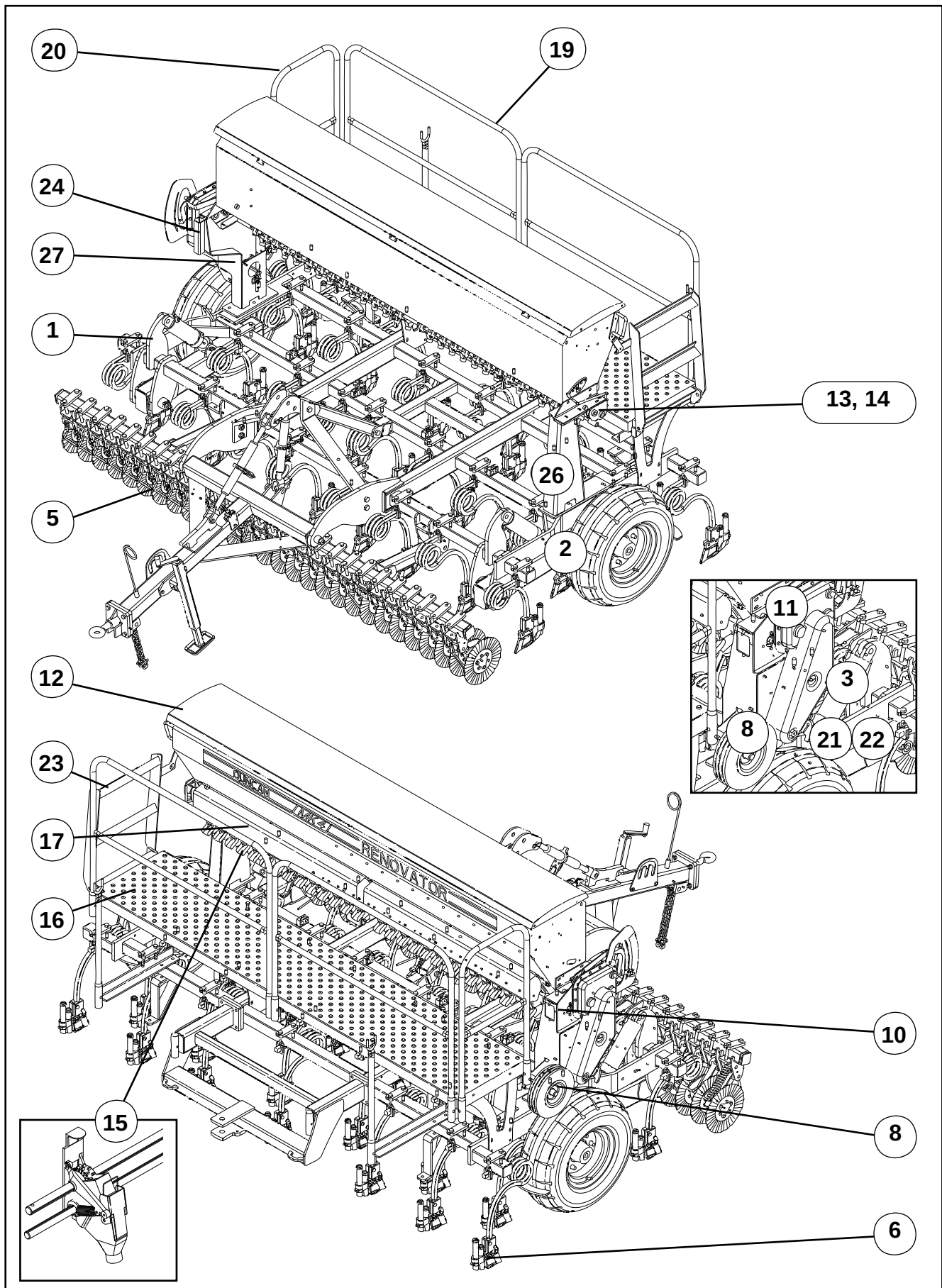
'Renovator' Seed Drill Dual Box Complete Assembly



'Renovator' Seed Drill Dual Box Complete Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	Refer pages 52-55	Main Frame and Drawbar Assembly	1
2	Refer pages 56	Wheel Leg	1
3	Refer pages 58-59	Wheel Hydraulics	1
4	Refer pages 88-89	Wiring and Lighting (Optional - not shown)	1
5	Refer pages 84-85	Disc Opener Assembly (Optional)	1
6	Refer pages 60-61	Tine and Boot Assembly	-
7	Refer pages 62-63	Drive Chains (Not shown)	-
8	Refer pages 68-69	Jockey Wheel and Transfer Drive System	1
9	Refer pages 81	Hectaremeter Kit (Not shown)	1
10	Refer page 67	Seed Box Drive Shafts	2
11	Refer page 70-71	Gearbox Final Assembly	1
12	Refer pages 72-75	Seedbox Assembly	2
13	Refer page 78	Agitator Drives	2
14	Refer page 79	Agitator Shaft Assembly (Inside Seedbox)	2
15	Refer page 80	Seeder Mechanism	-
16	60150	16/21/24 Run 3.0m Footboard Assembly	1
16	60350	20/24/28 Run 3.5m Footboard Assembly	1
17	Refer pages 72-75	16/21/24 Run 3.0m Calibration Tray	4
17	Refer pages 72-75	20/24/28 Run 3.5m Calibration Tray	4
18	60092	Drive Guard	1
19	60160	Safety Rail 3.0m	2
19	60360	Safety Rail 3.5m	2
20	60163	End Safety Rail 3.0/3.5m	1
21	25730	Jockey Arm Tension Spring	1
22	25723	Jockey Arm Tension Eyebolt	1
23	60175	Footboard Step	1
24	22051	Crank Arm and Handle Assy	1
25	60240	3.0m Weather Skirt (Not shown)	2
25	60242	3.5m Weather Skirt (Not shown)	2
26	60077	LH Pedestal W/Assy (Dual)	1
27	60081	Drive Pedestal W/Assy	1
28	26599	Calibration Tray Bracket	8

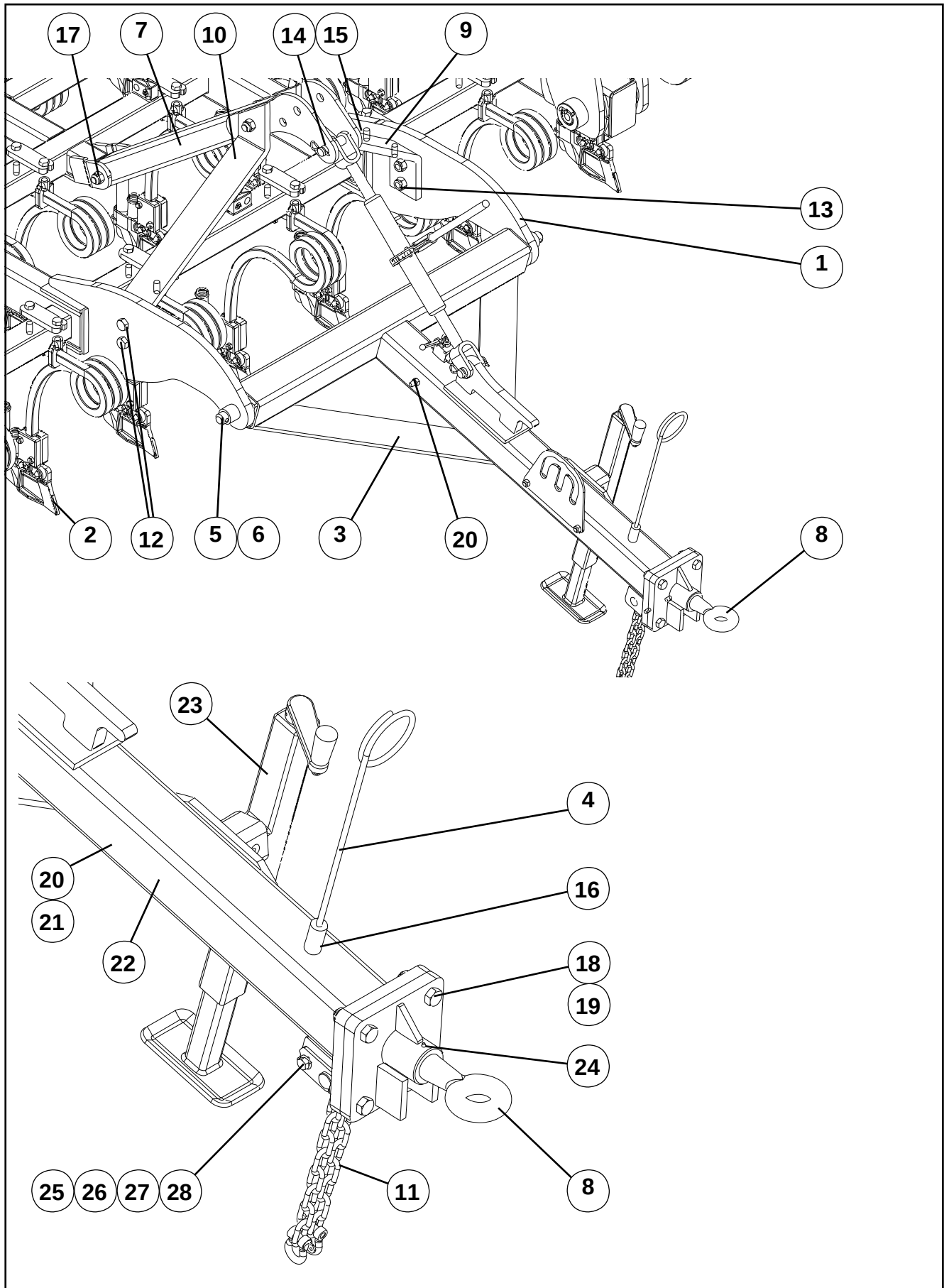
'Renovator' Seed Drill Single Box Complete Assembly



'Renovator' Seed Drill Single Box Complete Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	Refer pages 52-55	Main Frame and Drawbar Assembly	1
2	Refer pages 56-57	Wheel Leg	1
3	Refer pages 58-59	Wheel Hydraulics	1
4	Refer pages 88-89	Wiring and Lighting (Optional - not shown)	1
5	Refer pages 84-85	Disc Opener Assembly (Optional)	1
6	Refer pages 60-61	Tine and Boot Assembly	-
7	Refer pages 62-63	Drive Chains (Not shown)	-
8	Refer pages 68-69	Jockey Wheel and Transfer Drive System	1
9	Refer pages 81	Hectaremeter Kit (Not shown)	1
10	Refer page 67	Seed Box Drive Shafts	2
11	Refer page 70-71	Gearbox Final Assembly	1
12	Refer pages 76-77	Seedbox Assembly	2
13	Refer page 78	Agitator Drives	2
14	Refer page 79	Agitator Shaft Assembly (Inside Seedbox)	2
15	Refer page 80	Seeder Mechanism	-
16	60150	16/21/24 Run 3.0m Footboard Assembly	1
16	60350	20/24/28 Run 3.5m Footboard Assembly	1
17	Refer pages 76-77	16/21/24 Run 3.0m Calibration Tray	4
17	Refer pages 76-77	20/24/28 Run 3.5m Calibration Tray	4
18	60092	Drive Guard	1
19	60160	Safety Rail 3.0m	2
19	60360	Safety Rail 3.5m	2
20	60163	End Safety Rail 3.0/3.5m	1
21	25730	Jockey Arm Tension Spring	1
22	25723	Jockey Arm Tension Eyebolt	1
23	60175	Footboard Step	1
24	22051	Crank Arm and Handle Assy	1
25	60240	3.0m Weather Skirt (Not shown)	1
25	60242	3.5m Weather Skirt (Not shown)	1
26	60225	LH Pedestal W/Assy (Single)	1
27	60081	Drive Pedestal W/Assy	1
28	26599	Calibration Tray Bracket	4

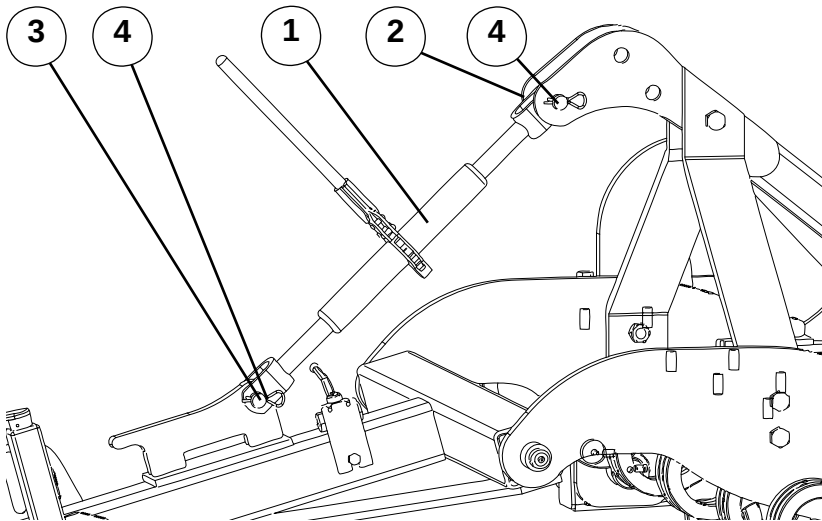
'Renovator' Seed Drill Mainframe and Drawbar



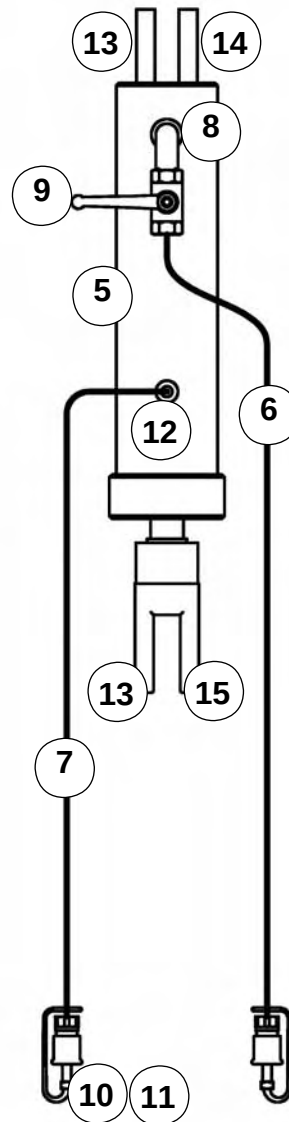
'Renovator' Seed Drill Mainframe and Drawbar

ITEM	PART No.	DESCRIPTION	QTY
1	60000	3.0m Mainframe (16/21/24 Run)	1
1	60200	3.5m Mainframe (20/24/28 Run)	1
2	Refer Pages 60-61	Coil Tines & Boots	-
3	60033	Drawbar Welded Assembly	1
4	4800315	Hose Support	1
5	60094	Drawbar Axle	1
6	45285	Roll Pin	2
7	60192	Centre Hitch Welded Assembly	1
8	60405	Towing Eye Assembly	1
9	26577	LH Support Stay	1
10	26578	RH Support Stay	1
11	43832	Safety Chain Assembly	2
12	45066	M20 x 70 Grade 8.8 Bolt	4
13	45141	M20 Nyloc Nut	6
14	47244	7/8" UNF Bolt x 6.5"	1
15	47548	7/8" UNF Nut	1
16	45181	M8 x 12 S/H Grub Screw	1
17	45075	M20 x 150 Grade 8.8 Bolt	1
18	45042	M16 x 60 Grade 8.8 Bolt	4
19	45140	M16 Nyloc Nut	4
20	45033	M12 x 120 Grade 8.8 Bolt	2
21	45139	M12 Nyloc Nut	3
22	60409P	Hose Rack	1
23	Refer Pages 90-91	Stand Kit – Optional	1
24	43007	Grease Nipple	1
25	22262	Clevis Pin Tabbed	1
26	45001s	M10 x 20 S/Screw Grade 8.8 ZP	1
27	45152	M10 Light Flat Washer	1
28	45166	M10 Spring Washer	1

'Renovator' Seed Drill Mainframe and Drawbar



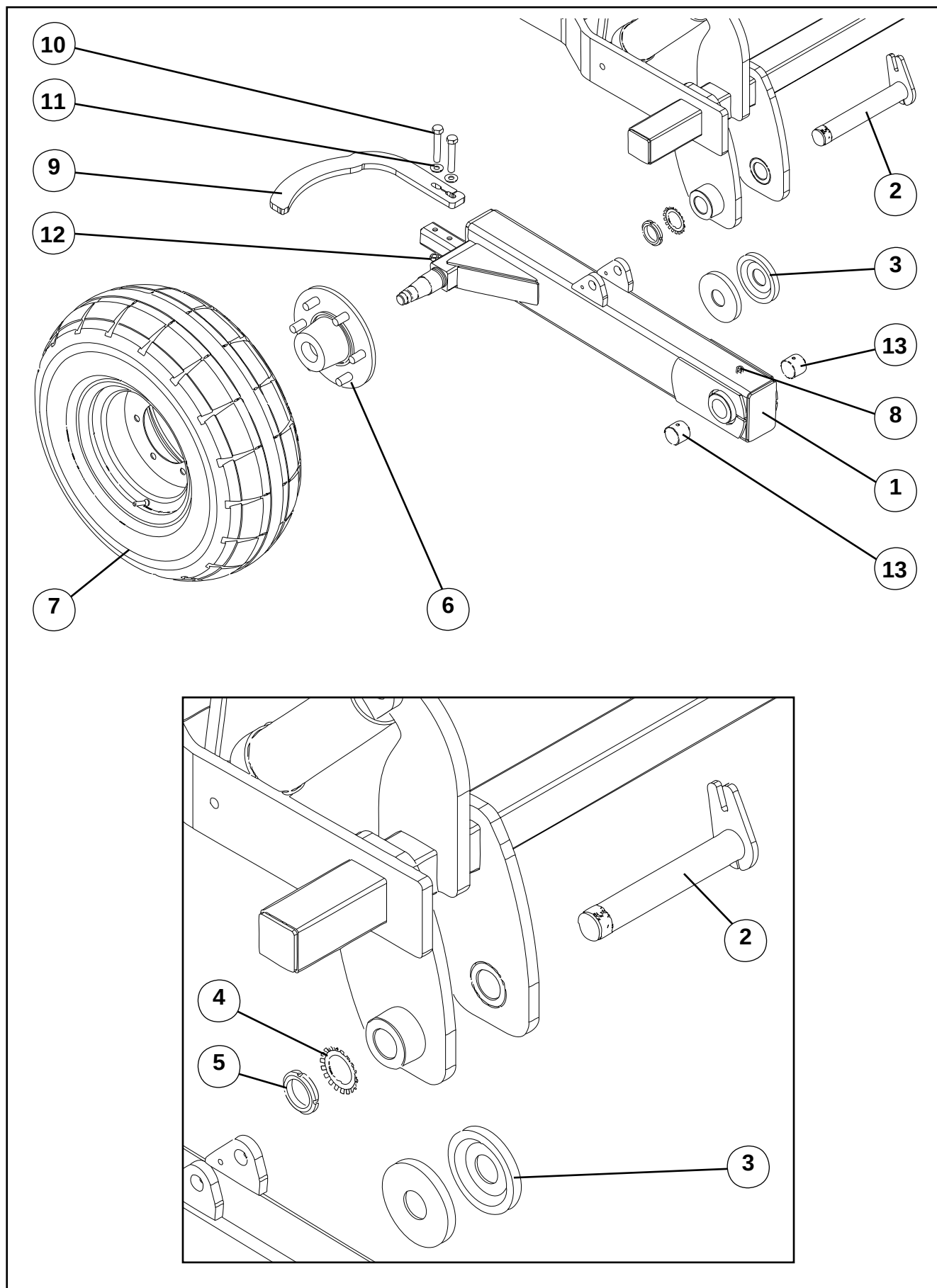
Note: Drawbar hydraulic parts can be purchased as a kit.
The part number is 26720K.



'Renovator' Seed Drill Mainframe and Drawbar

ITEM	PART No.	DESCRIPTION	QTY
		Drawbar Turnbuckle Parts	
1	43395	H/D Ratchet Turnbuckle	1
2	47254	Bolt 1" UNF x 5" HT	1
3	47251	Bolt 1" UNF x 3.5" HT	1
4	47552	1" UNF Nyloc Nut	2
		Drawbar Hydraulic Parts	
5	43852	Hydraulic Cylinder	1
6	26723	Hydraulic Hose 2.80m	1
7	26724	Hydraulic Hose 2.50m	1
8	43496	3/4" UNO to 3/8"BSPT Elbow	1
9	43393	3/8" BSP S/S Ball Valve	1
10	43147	1/2" BSP Quick Release Coupling	2
11	43617	Dust Cover	2
12	43280	3/4" UNO to 3/8" BSPM Nipple	1
13	47552	1" UNF Nyloc Nut	2
14	47254	Bolt 1" UNF x 5" HT	1
15	47251	Bolt 1" UNF x 3.5" HT	1

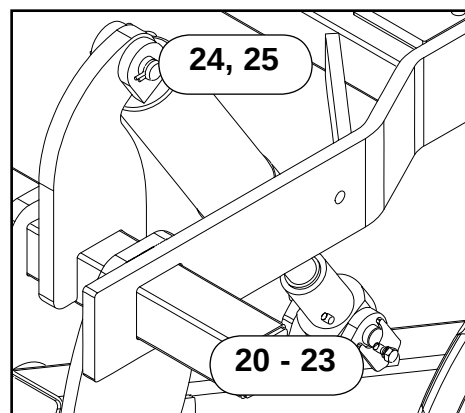
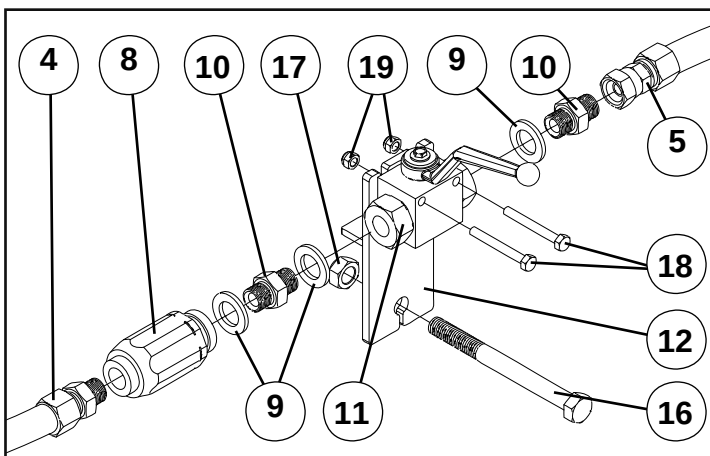
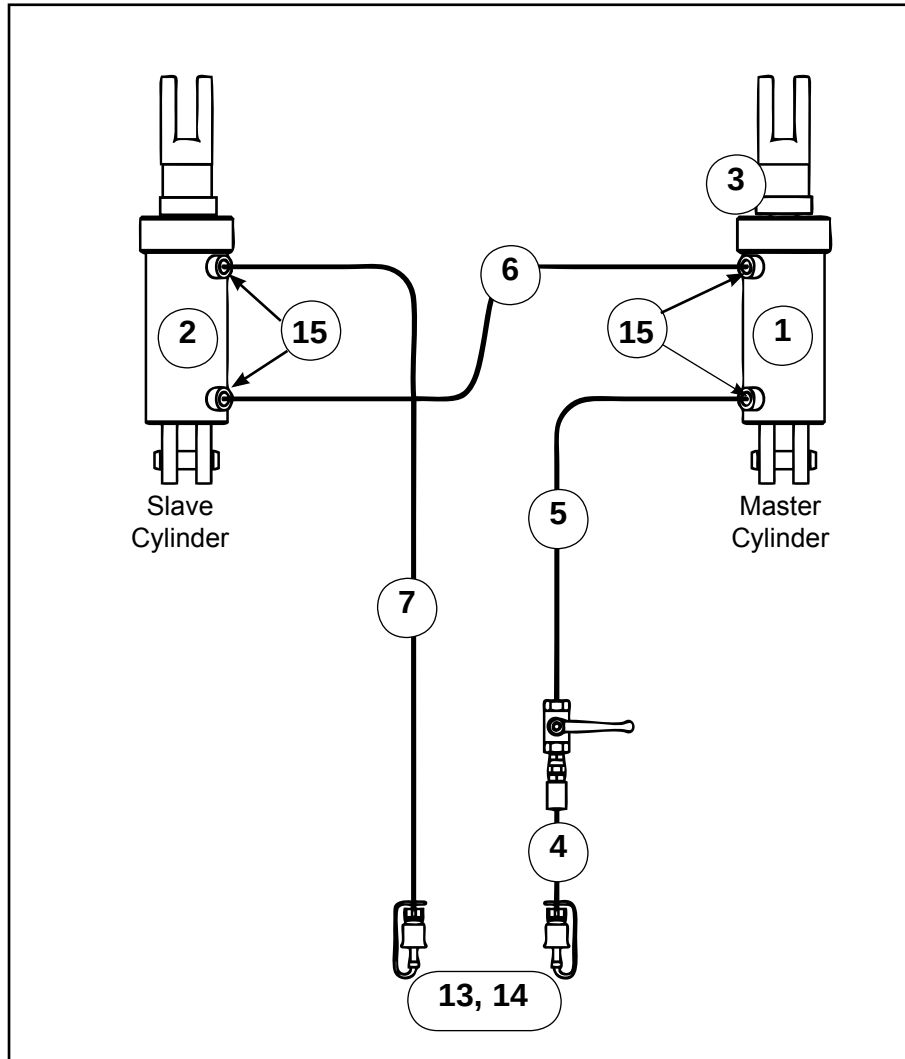
'Renovator' Seed Drill Wheel Leg



‘Renovator’ Seed Drill Wheel Leg

ITEM	PART No.	DESCRIPTION	QTY
1	60045PH	Left Hand Wheel Leg (not shown)	1
1	60061PH	Right Hand Wheel Leg	1
2	60247	Pivot Pin	2
3	60065	Spacer	4
4	45619	Lock Washer	2
5	45618	Lock Nut	2
6	45648	Hub and Stub	2
7	45638	Wheel	2
8	43010	90° Grease Nipple	2
9	60059p	Wheel Scraper	2
10	45030	M12 x 90 Gr 8.8 Z/P Bolt	4
11	45159	M12 HD Washer	4
12	45139	M12 Nyloc Nut	4
13	43426	Glacier Bush Ø45	4
14	Call	Hub Rebuild kit	-

'Renovator' Seed Drill Wheel Hydraulics

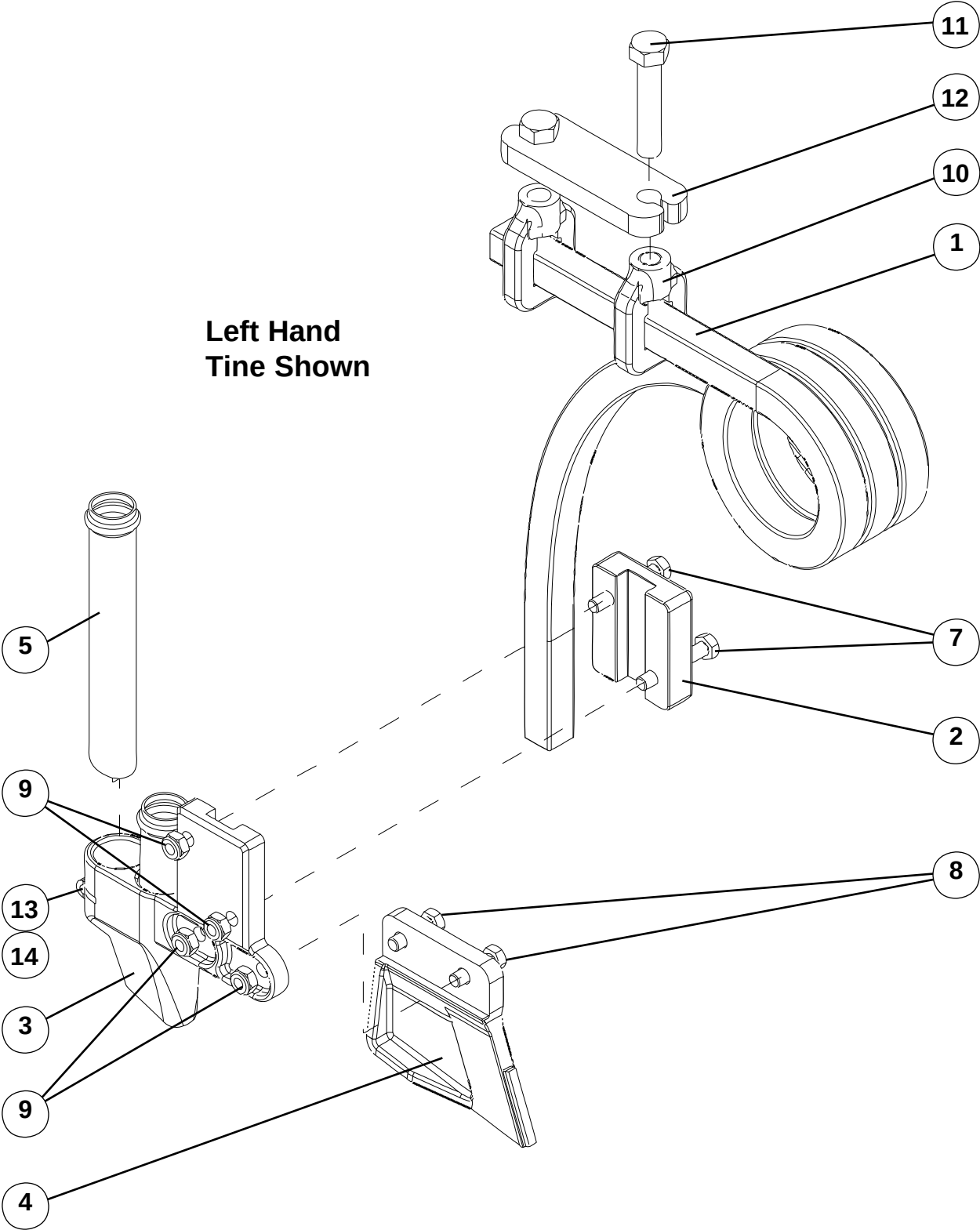


‘Renovator’ Seed Drill wheel Hydraulics

ITEM	PART No.	DESCRIPTION	QTY
1	26702	3.5" x 6.5" Master Rephasing Cylinder (Includes pin)	1
2	26703	3.25" x 6.5" Slave Rephasing Cylinder (Includes pin)	1
3	43848	Stroke Limiting Collar 7/8" (where fitted)	1
4	60866	Hydraulic Hose, 2.70m (3.0m and 3.5m machines)	1
5	60864	Hydraulic Hose, 2.70m (3.0m machine)	1
5	60869	Hydraulic Hose, 2.80m (3.5m machine)	1
6	60864	Hydraulic Hose, 2.70m (3.0m machine)	1
6	60868	Hydraulic Hose, 3.10m (3.5m machine)	1
7	60863	Hydraulic Hose, 5.45m (3.0m machine)	1
7	60867	Hydraulic Hose, 5.70m (3.5m machine)	1
8	43028	3/8" Flow Control	1
9	43391	3/8" Dowty Washer	3
10	43392	3/8" BSPP Male Nipple	2
11	43393	3/8" BSP S/S Ball Valve	1
12	60856	Hydraulic Valve Support Assy	1
13	43147	1/2" BSP Quick Release Coupling	2
14	43617	Dust Cover	2
15	43280	3/4" UNO to 3/8" BSP Nipple	4
16	45033	M12 x 120 Bolt	1
17	45139	M12 Nyloc Nut	1
18	44957	M6 X 50 Bolt	2
19	45136	M6 Nyloc Nut	2
20	22270	Clevis Spacer	2
21	22262	Clevis Pin Assembly	2
22	45418s	M10 x 25 Set Screw	2
23	45166	M10 Spring Washer	2
24	26558	Clevis Pin	2
25	45272	R Clip	2

'Renovator' Seed Drill Tine and Boot Assembly

Left Hand
Tine Shown

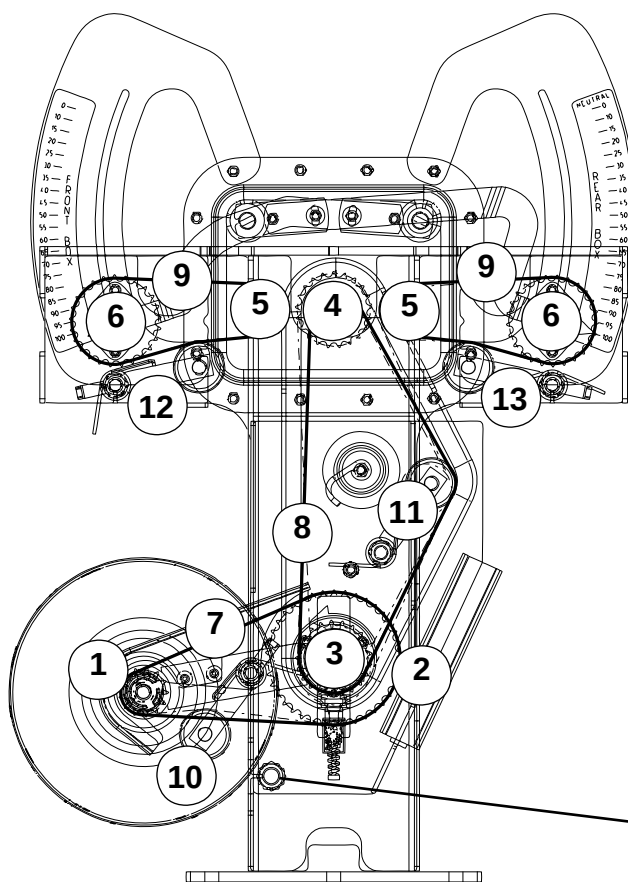


'Renovator' Seed Drill Tine and Boot Assembly

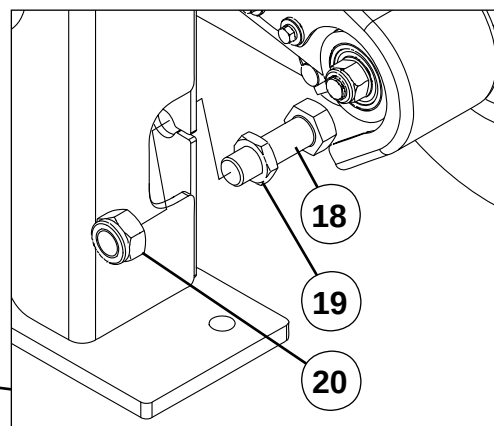
ITEM	PART No.	DESCRIPTION	3.0m			3.5m		
			16R	21R	24R	20R	24R	28R
1	21413	LH Coil Tine	8	11	12	10	11	14
1	21414	RH Coil Tine	8	10	12	10	13	14
2	26848	LH Inverted Tee Clamp	16	21	24	20	24	28
3	25615	RH Inverted Tee Clamp	16	21	24	20	24	28
4	26849	Cast Inverted Tee Point	16	21	24	20	24	28
5	25608	Fertilizer Tube, Standard (dual box)	12	17	20	16	20	24
6	25613	Fertilizer Tube, Angle (dual box)	4	4	4	4	4	4
7	45010	M10 x 65 Bolt, Class 8.8	32	42	48	40	48	56
8	45003	M10 x 30 Bolt, Class 8.8	32	42	48	40	48	56
9	45138	M10 Nyloc Nut	64	84	96	80	96	112
10	21691	Tine Clamp Casting	32	42	48	40	48	56
11	45466	M16 x 80 (4.6) Zinc Plated Bolt	32	42	48	40	48	56
12	21690	75 x 75 RHS Clamp Plate	16	21	24	20	24	28
13	45413	M8 x 35 Bolt (dual box)	16	21	24	20	24	28
14	45137	M8 Nyloc Nut (dual box)	16	21	24	20	24	28
15	43691	Feed Hose 38mm	-					

'Renovator' Seed Drill Drive Chains Dual Box

ITEM	PART No.	DESCRIPTION	QTY
1	25724	13 T Sprocket 1/2" P x 20mm Bore	1
2	25742	38 T Sprocket 1/2" P x 25mm Bore	1
3	26352	13T/21T Crank Sprocket	1
4	26350	13T/21T Change Sprocket	1
5	22044	15 T Sprocket 1/2" P x 20mm Bore	2
6	22537	25 T Sprocket 1/2" P x 20mm Bore	2
7	24103	1/2" BS Chain x 61 Links (Jockey Wheel Drive)	1
8	60269	1/2" BS Chain x 87 Links (Transfer Shaft to Gearbox input)	1
9	25780	1/2" BS Chain x 47 Links (Gearbox to Boxshaft)	2
10	Refer page 66	Chain Tensioner Jockey Wheel Drive	1
11	Refer page 64-65	Chain Tensioner Transfer Drive	1
12	Refer page 64	Rear Chain Tensioner Box Shaft	1
13	Refer page 64	Front Chain Tensioner Box Shaft	1
14	22294	Sprocket Key (6 x 6 x 25)	8
15	45180	M8 x 10 Socket Head Grub Screw	14
16	45181	M8 x 12 Socket Head Grub Screw	2
17	43388	1/2" Pitch Joining Link	4
18	45065	M20 x 65 8.8 Bolt Z/P	1
19	45120	M20 8.8 Half Nut Z/P	1
20	45141	M20 Nyloc Nut	1

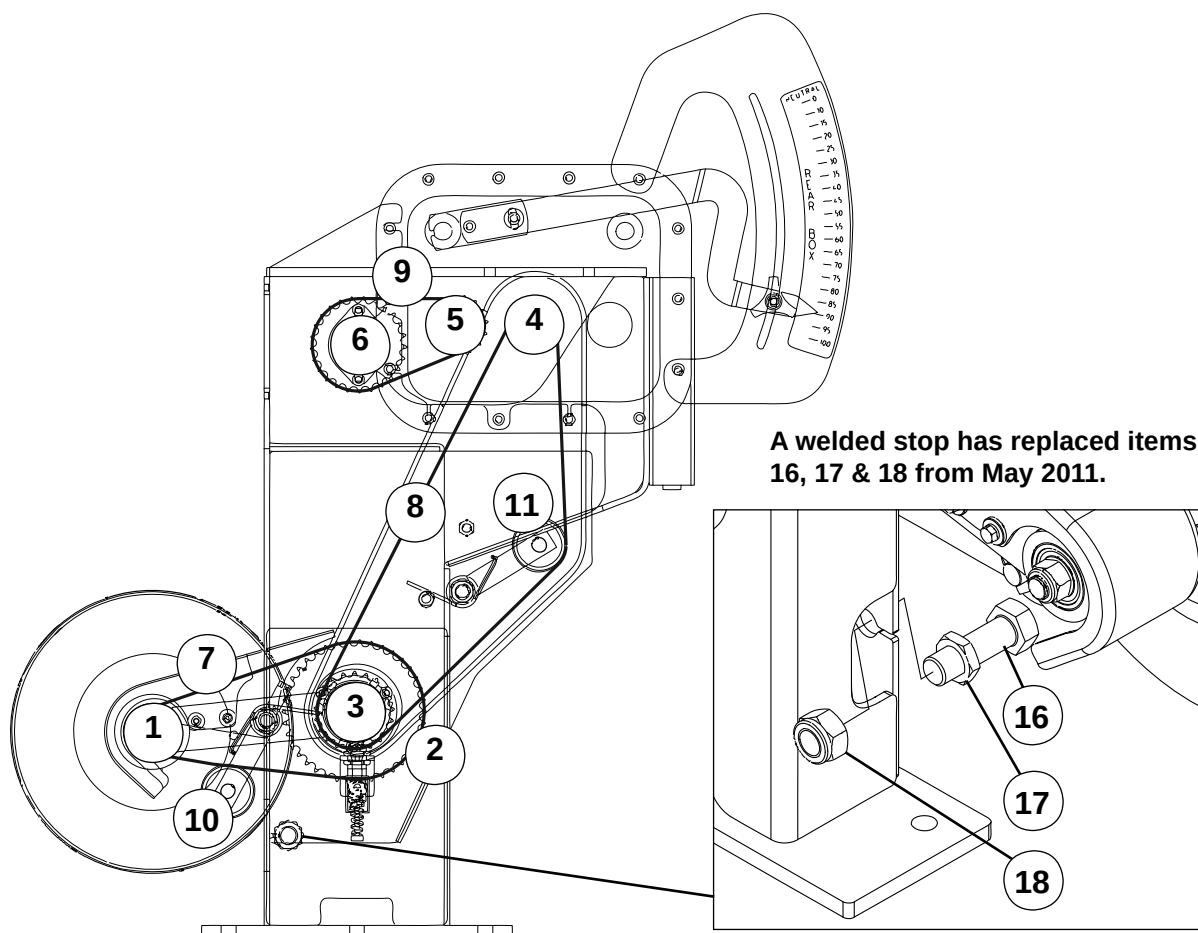


A welded stop has replaced items 18, 19 & 20 from May 2011.



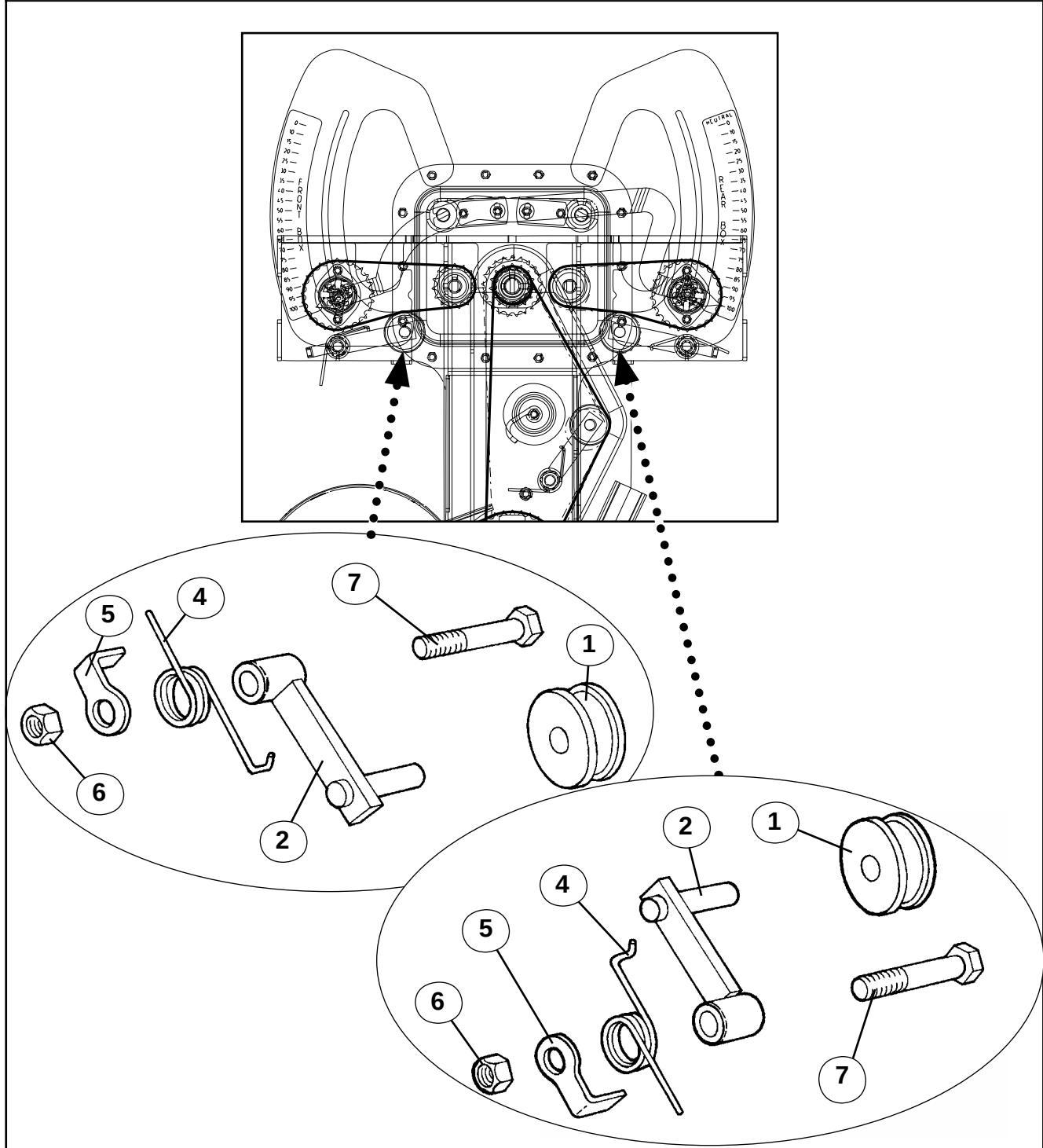
'Renovator' Seed Drill Drive Chains Single Box

ITEM	PART No.	DESCRIPTION	QTY
1	25724	13 T Sprocket 1/2" P x 20mm Bore	1
2	25742	38 T Sprocket 1/2" P x 25mm Bore	1
3	26352	13T/21T Crank Sprocket	1
4	26350	13T/21T Change Sprocket	1
5	22044	15 T Sprocket 1/2" P x 20mm Bore	2
6	22537	25 T Sprocket 1/2" P x 20mm Bore	2
7	24103	1/2" BS Chain x 61 Links (Jockey Wheel Drive)	1
8	60269	1/2" BS Chain x 87 Links (Transfer Shaft to Gearbox input)	1
9	25781	1/2" BS Chain x 37 Links (Gearbox to Boxshaft)	1
10	Refer page 66	Chain Tensioner Jockey Wheel Drive	1
11	Refer page 65	Chain Tensioner Transfer Drive	1
12	22294	Sprocket Key (6 x 6 x 25)	6
13	45180	M8 x 10 Socket Head Grub Screw	8
14	45181	M8 x 12 Socket Head Grub Screw	2
15	43388	1/2" Pitch Joining Link	3
16	45065	M20 x 65 8.8 Bolt Z/P	1
17	45120	M20 8.8 Half Nut Z/P	1
18	45141	M20 Nyloc Nut	1



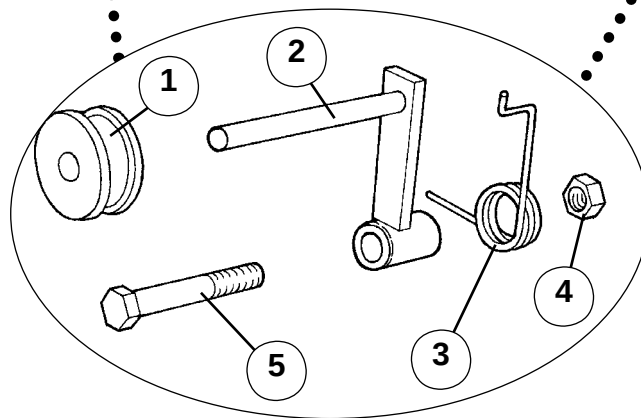
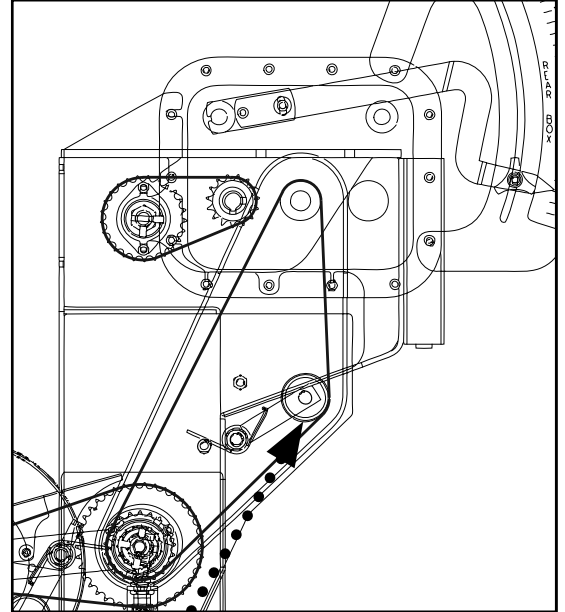
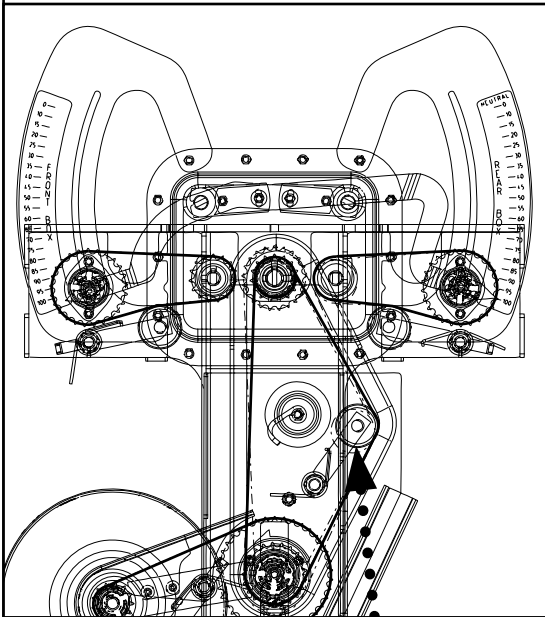
‘Renovator’ Seed Drill Chain Tensioners

ITEM	PART No.	DESCRIPTION	QTY
1	22535	Nylon Roller	2
2	22480	Arm Assembly, RH	2
3	22522	Torsion Spring, LH	1
4	22523	Torsion Spring, RH	1
5	23376	Chain Tensioner Anchor	2
6	45132	M16 Hex Nut	2
7	45462	M16 x 60 Bolt	2



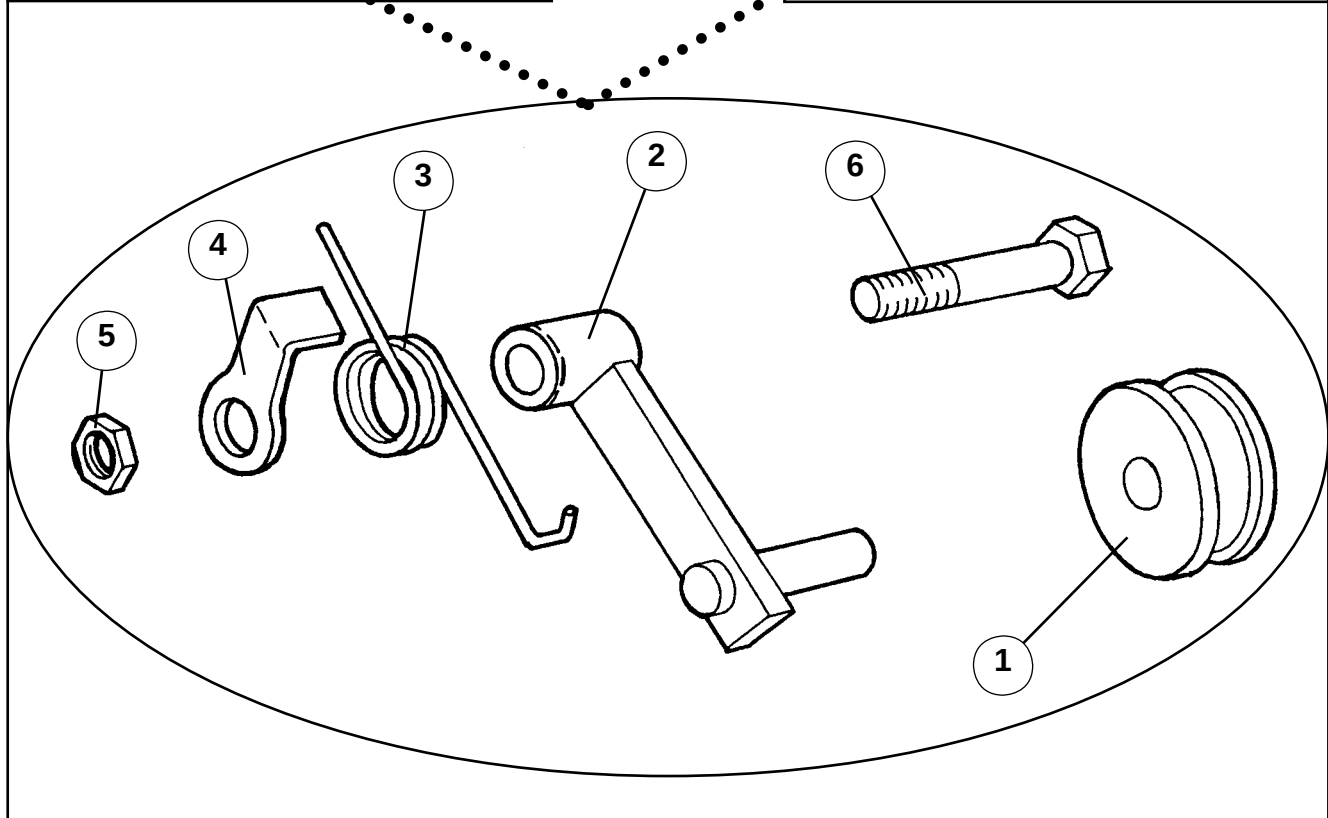
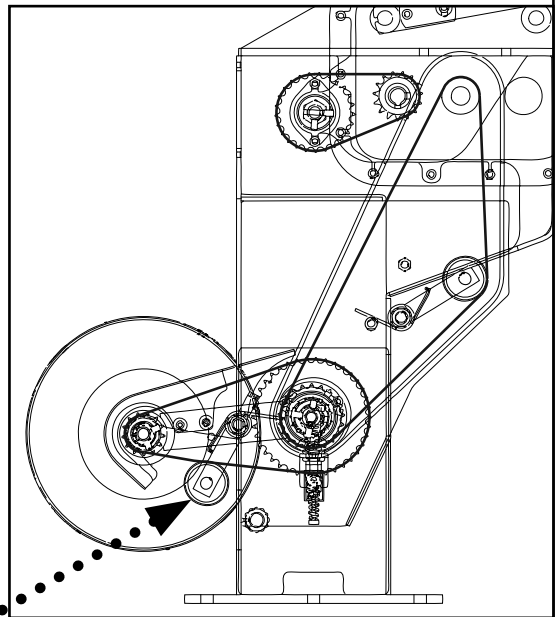
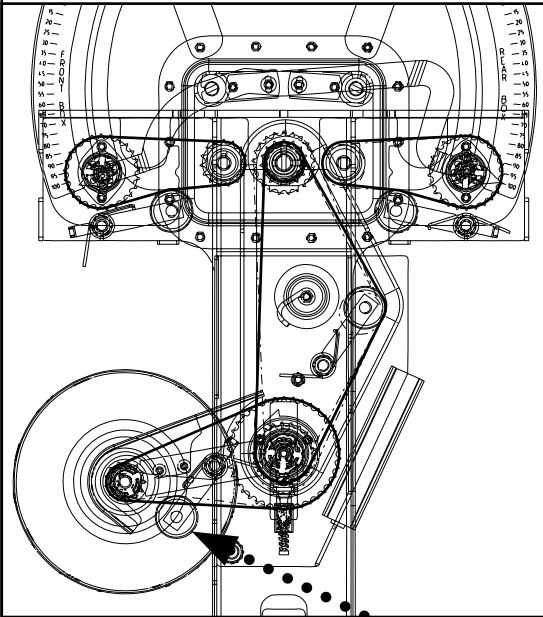
'Renovator' Seed Drill Chain Tensioners

ITEM	PART No.	DESCRIPTION	QTY
1	22535	Nylon Roller	1
2	25984	Arm Assembly, RH, 60 Extension	1
3	22523	Torsion Spring, RH	1
4	45132	M16 Hex Nut	1
5	45461	M16 x 55 Bolt	1



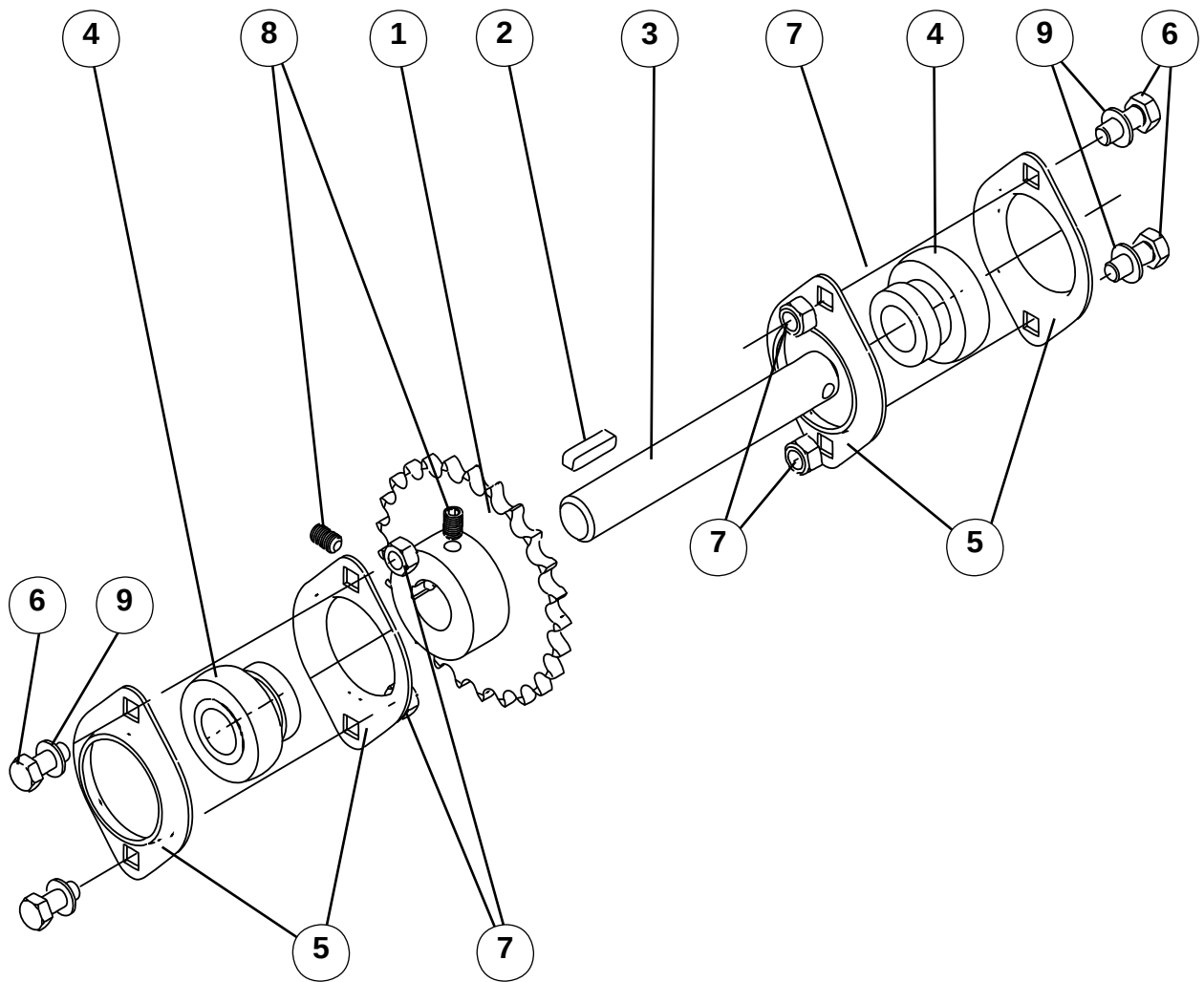
‘Renovator’ Seed Drill Chain Tensioners

ITEM	PART No.	DESCRIPTION	QTY
1	22535	Nylon Roller	1
2	23373	Short Arm Assembly, LH	1
3	22523	Torsion Spring, RH	1
4	23376	Chain Tensioner Anchor	1
5	45119	M16 Half Nut	1
6	45462	M16 x 60 Bolt	1

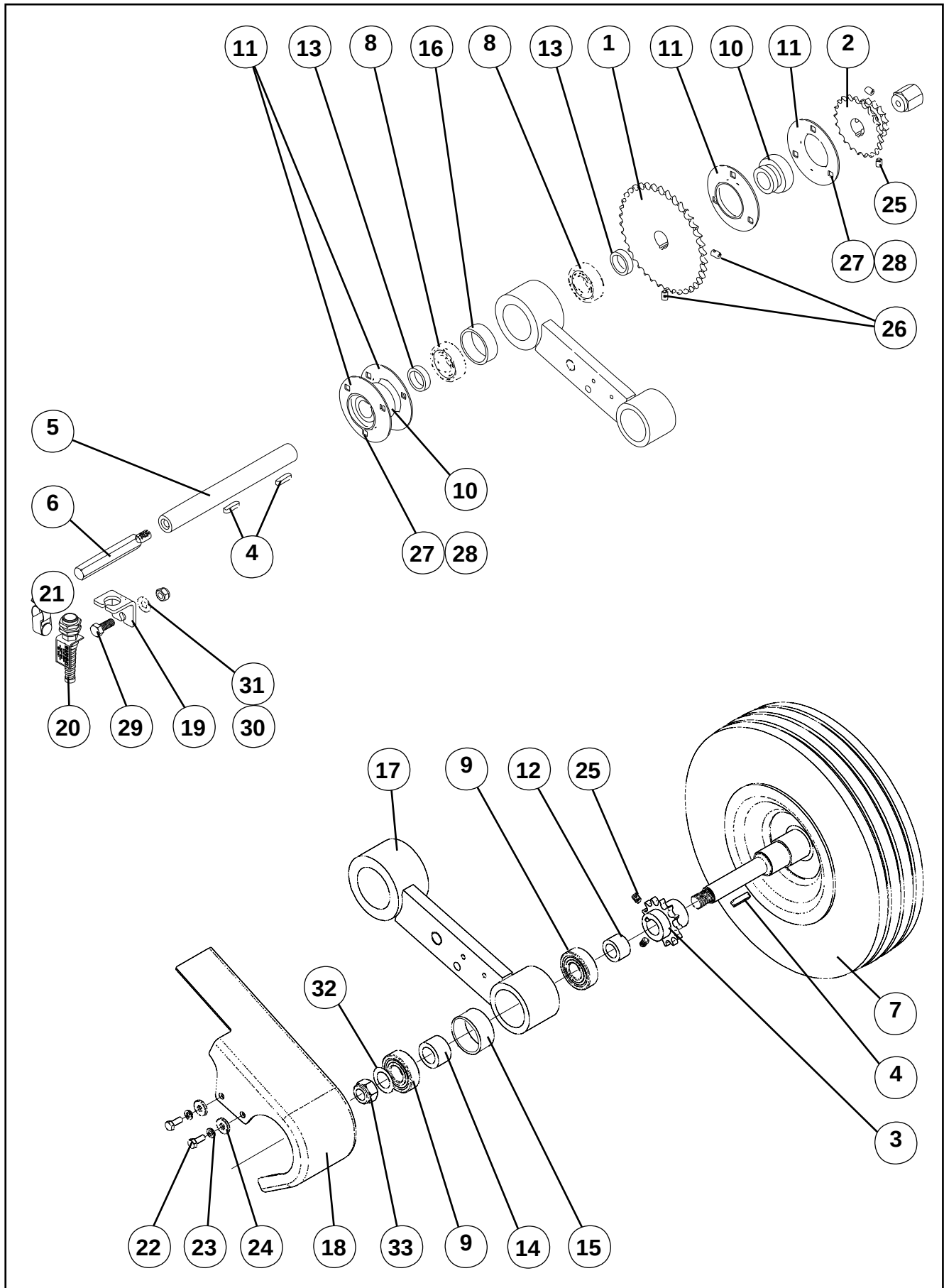


'Renovator' Seed Drill Seed Box Drive Shafts

ITEM	PART No.	DESCRIPTION	QTY
1	22537	Sprocket, 25T x 1/2" Pitch	1
2	22294	Key, Sprocket 6 x 6 x 25	1
3	25758	Shaft, Box Drive	1
4	43385	"Y" Bearing	2
5	43387	Housing, Bearing, Press Steel (2 Flanges = 1 Housing)	2
6	45411S	Set Screw, M8 x 20, Zinc Plate	4
7	45137	Nut, M8, Nylock	4
8	45181	Grubscrew, M8 x 12, Socket Head	2
9	45151	M8 Light Flat Washer	8



'Renovator' Seed Drill Jockey Drive

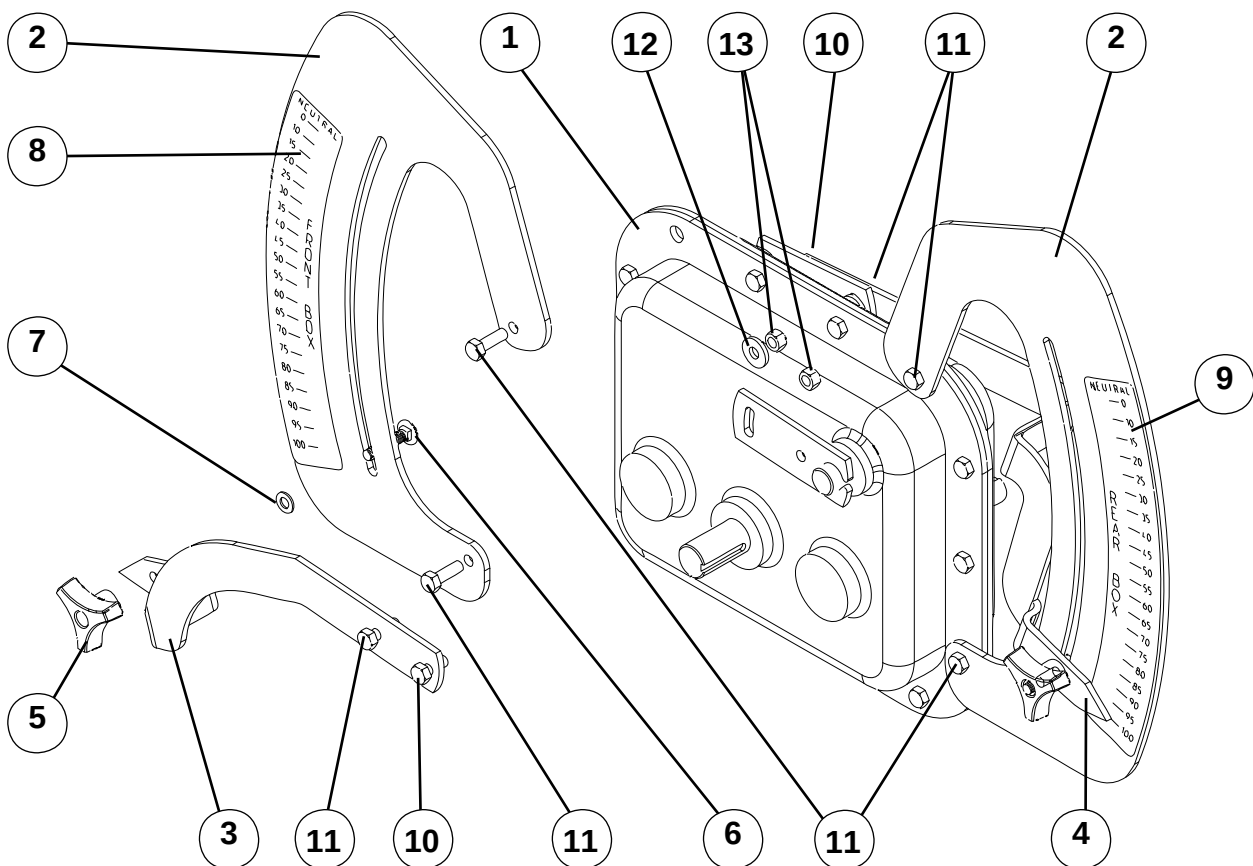


'Renovator' Seed Drill Jockey Drive

ITEM	PART No.	DESCRIPTION	QTY
1	25742	38T 1/2" P (25mm Bore) Sprocket	1
2	26352	13T/21T 1/2"P Crank Sprocket	1
3	25724	13T 1/2" P (20mm Bore) Sprocket	1
4	22294	6 x 6 x 25 Sprocket Key	3
5	26569	Drive Pedestal Shaft, Transfer	1
6	26568	Hexagonal Drive Shaft	1
7	25744	Jockey Wheel and Axle Assembly	1
8	43036	Drive Pedestal Transfer Shaft Bearing	2
9	17127	Jockey Wheel Axle Bearing	2
10	43386	"Y" Bearing	2
11	30359	3 Bolt Bearing Housing, PF52, (2 Flanges = 1 Housing)	2
12	25726	Jockey Drive Axle Spacer (where fitted)	1
13	25725	Jockey Arm Pivot Spacer	2
14	25739	Jockey Axle Inner Spacer	1
15	25727	Jockey Axle Outer Spacer (Loctite in place when fitted)	1
16	25729	Jockey Arm Pivot Outer Spacer (Loctite in place when fitted)	1
17	25735	Jockey Wheel Arm	1
18	25746	Jockey Drive Swing Guard	1
19	26567	Sensor Mount Bracket	1
20	43403	Sensor	1
21	43404	Magnet and Clamp	1
22	45401S	M6 x 16, Z/P Set Screw	2
23	45164	M6, Z/P Spring Washer	2
24	45156	M6, H/D Z/P Flat Washer	2
25	45180	M8 x 10 Socket Head Grubscrew	4
26	45181	M8 x 12 Socket Head Grubscrew	2
27	45411S	Set Screw, M8 x 20 Class 4.6, Zinc Plated	6
28	45137	M8, Nyloc Nut	6
29	45417S	M10 x 20 Class 4.6, Z/P Set Screw	1
30	45152	M10 Light Flat Washer	1
31	45138	M10 Nyloc Nut	1
32	47625	M16 Bellevilles Disc Washer	1
33	45140	M16 Nyloc Nut	1

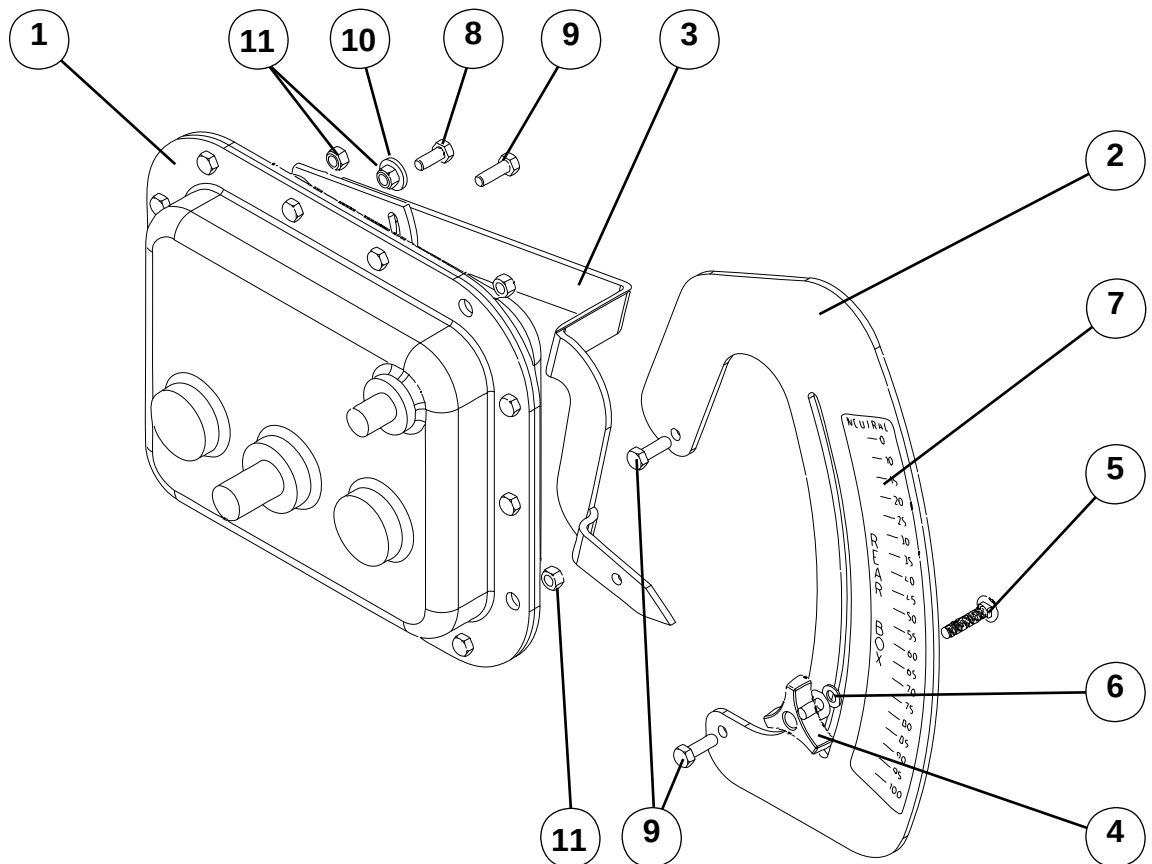
'Renovator' Seed Drill Dual Gearbox Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	25756	Gearbox Sub-Assembly	1
2	22036	Quadrant, Speed Adjusting	2
3	25754	Lever, Front, Speed Adjusting	1
4	25755	Lever, Rear, Speed Adjusting	1
5	43366	Tri-Knob, M8, Tapped Centre	2
6	47031	Bolt, Coach, M8 x 40 Cup Head, Class 4.6, Zinc Plated	2
7	45151	Washer, Flat, M8, Light	2
8	22041	Label, Front Box Speed Indicator (black writing on yellow background)	1
9	22042	Label, Rear Box Speed Indicator (yellow writing on black background)	1
10	44992s	Set Screw M8 x 20 Grade 8.8 Zinc Plate	2
11	44993s	SetScrew M8 x 25 Grade 8.8 Zinc Plate	6
12	45157	Washer, Flat, M8, Heavy Duty, Zinc Plate	2
13	45137	Nut, M8 Nyloc	8
14	25762	Gearbox Final Assembly (Includes items 1 to 13)	1
15	26359	13T/21T 1/2"P Change Sprocket (not illustrated)	1
16	22294	Sprocket Key (not illustrated)	1
17	45180	Grub Screw, M8 x 10 Socket Head (not illustrated)	2

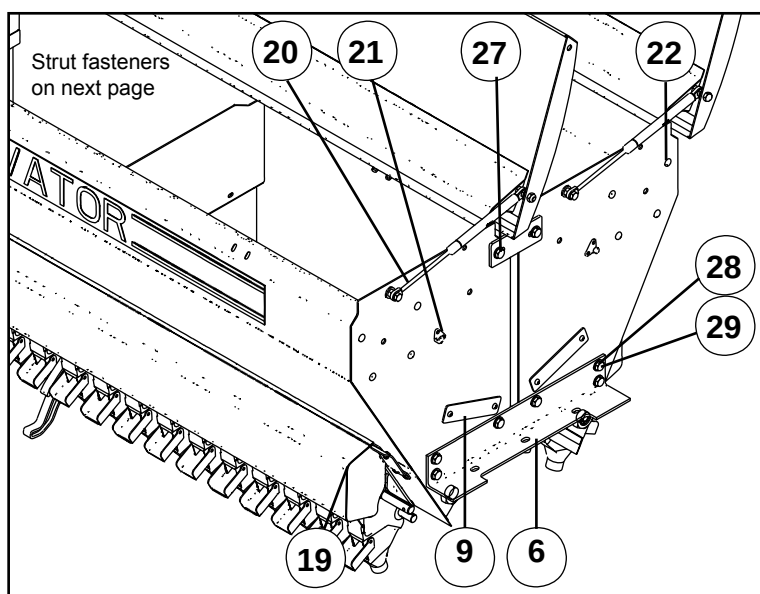
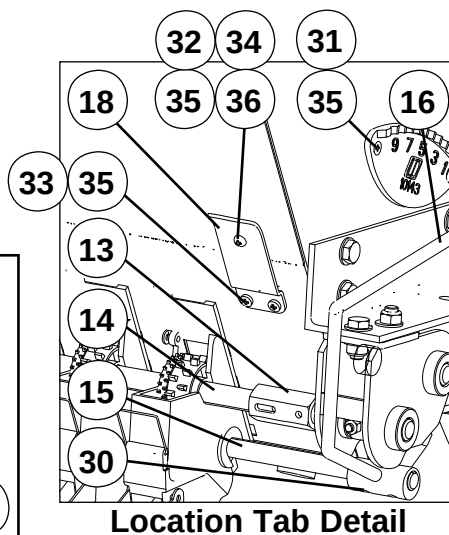
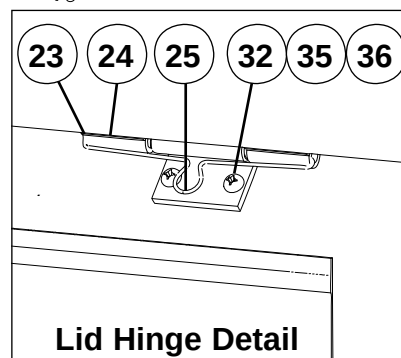
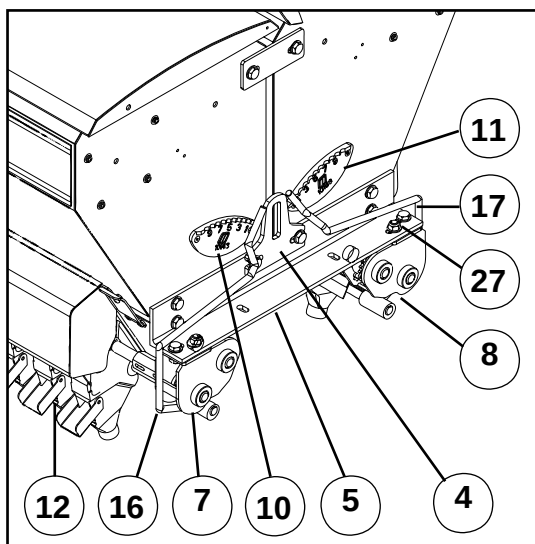
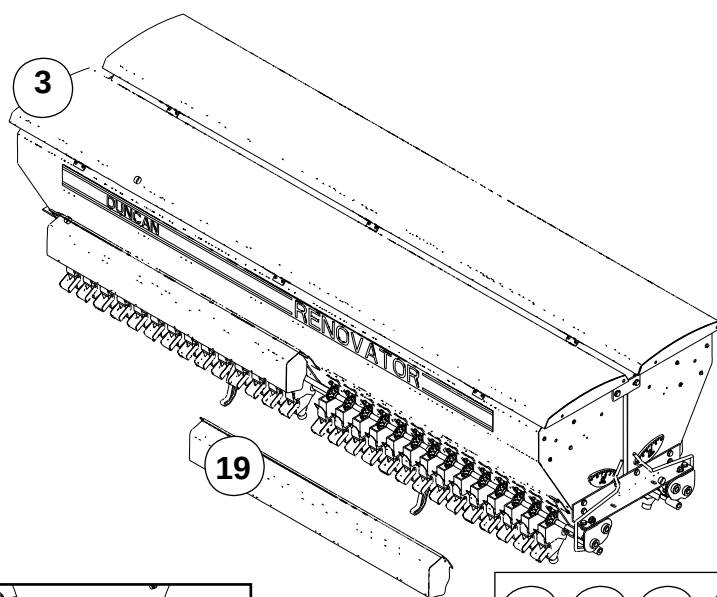


‘Renovator’ Single Gearbox Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	25763	Single Output Gearbox Sub-Assembly	1
2	22036	Quadrant, Speed Adjusting	1
3	25755	Lever, Rear, Speed Adjusting	1
4	43366	Tri-Knob, M8, Tapped Centre	2
5	47031	Bolt, Coach, M8 x 40 Cup Head, Class 4.6, Zinc Plated	1
6	45151	Washer, Flat, M8, Light	1
7	22042	Label, Rear Box Speed Indicator (yellow writing on black background)	1
8	44992s	Set Screw M8 x 20 Grade 8.8 Zinc Plate	1
9	44993s	SetScrew M8 x 25 Grade 8.8 Zinc Plate	3
10	45157	Washer, Flat, M8, Heavy Duty, Zinc Plate	1
11	45137	Nut, M8 Nyloc	4
12	25764	Gearbox Final Assembly (Includes items 1 to 11)	1
13	26359	13T/21T 1/2" P Change Sprocket (not illustrated)	1
14	22294	Sprocket Key (not illustrated)	1



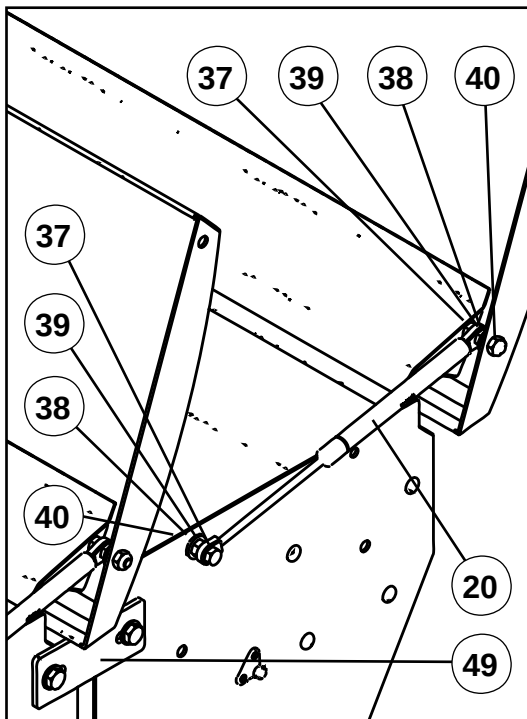
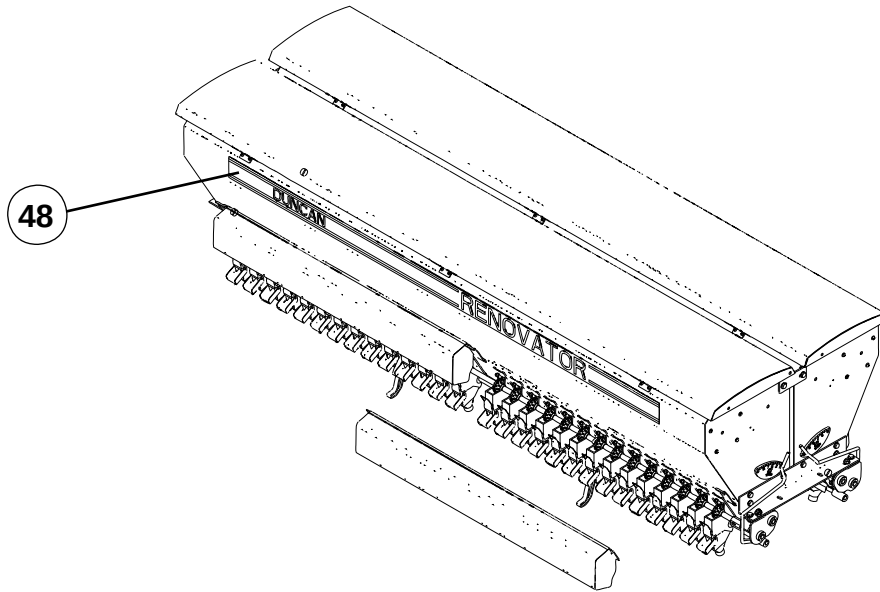
'Renovator' Seed Drill Dual Seedbox Assembly



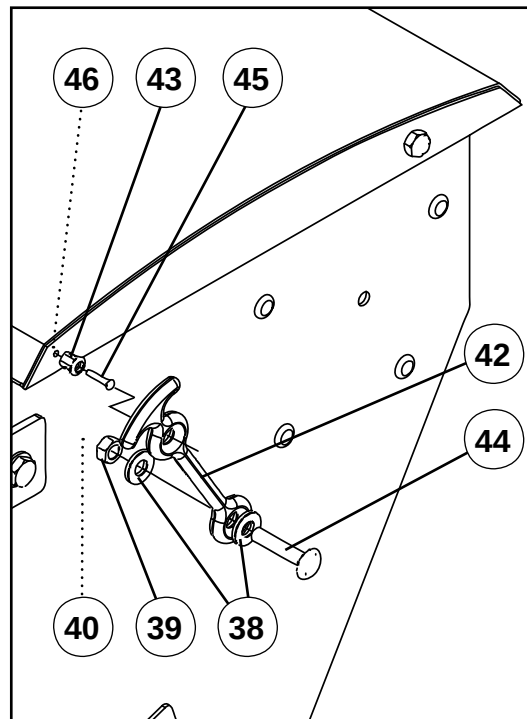
'Renovator' Seed Drill Dual Seedbox Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	Refer Table Below	Box Only	2
2	Refer Table Below	Box with Lid	2
3	Refer Table Below	Lid Only	2
4	22485P	Box Set Lifting Eye Profile	2
5	60116#	Box Set Mounting Bracket LH	1
6	60117#	Box Set Mounting Bracket RH	1
7	60118PH	Front Agitator Drive assy	1
8	60110PH	Rear Agitator Drive assy	1
9	22855#	Agitator Access Blanking Plate	2
10	10143	Front Box Quadrant Plate	1
11	10158	Rear Box Reverse Quadrant Plate	1
12	Refer Page 65	Seeder Assembly	32,40,42,48,56
13	22419#	Box Shaft Connecting Sleeve	2
14	Refer Table Below	Box Shaft (20mm)	2
15	Refer Table Below	Flap Shaft (18mm)	2
16	60096	Front Flapshaft Handle w/assy	2
17	60098	Rear Flapshaft Handle w/assy	2
18	22568	Location Tab (Calibration Tray)	6
19	Refer Table Below	Calibration Tray	4
20	45644	Gas Strut Mk4	4
21	43430	Lashing Hook	4
22	14442	Rubber Body Plug	28
23	29163	Hinge Assembly	6
24	22491	Hinge Pin	6
25	27599	Hinge Pin Spring Clip	6
26	43373	Black Edge Trim (Refer Table Below for Length per Box)	2
27	45019s	M12 x 30 Set Screw Class 8.8 Zinc Plate	20
28	45153	M12 Light Flat Washer	40
29	45139	M12 Nyloc Nut	20
30	45186	M10 x 12 Socket Head Grubscrew	4
31	45758	M6 x 16 Zinc Plated Countersunk Posidrive Screw	4
32	45908	M6 x 16 Zinc Plated Pan Head Machine Screw	21
33	45907	M6 x 12 Zinc Plated Pan Head Machine Screw	6
34	45122	M6 Class 8.8 Zinc Plated Hex Nut	5
35	45136	M6 Nylock Nut	26
36	45150	M6 Zinc Plated Light Flat Washer	12
Continued on following pages...			

'Renovator' Seed Drill Dual Seedbox Assy (cont)



**Gas Strut Fastener
Detail**



Rubber Latch Detail

'Renovator' Seed Drill Dual Seedbox Assy (cont)

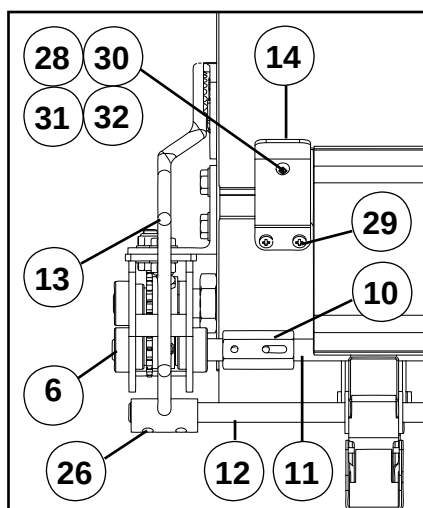
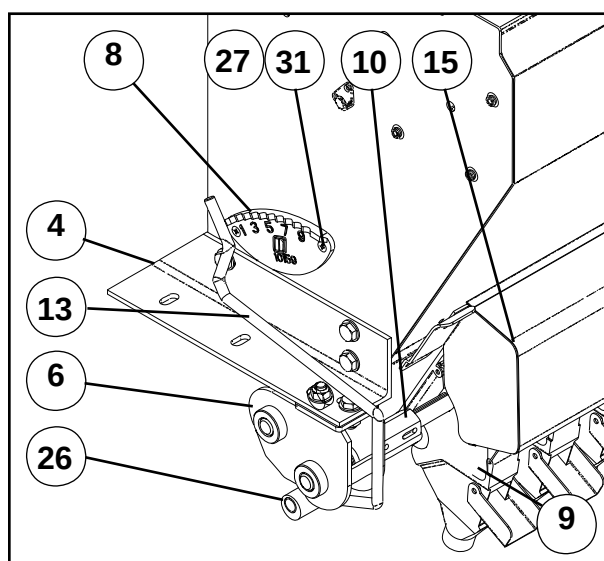
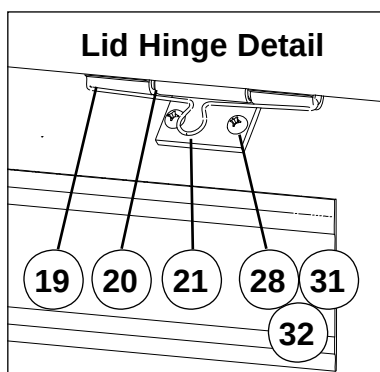
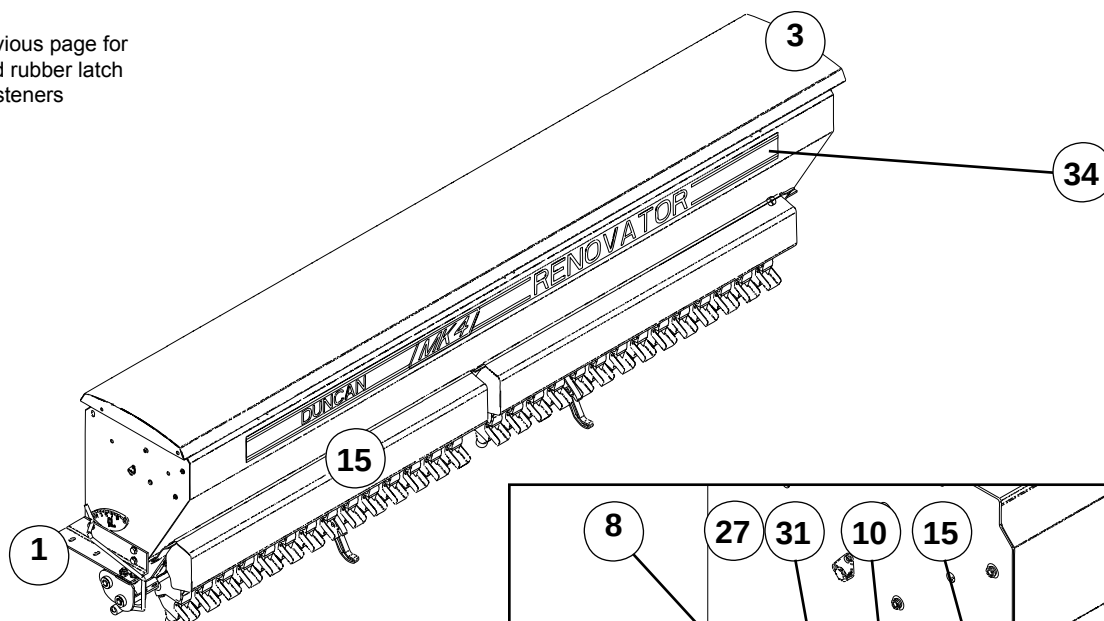
ITEM	PART No.	DESCRIPTION	QTY
37	45005	M10x 40 Bolt Class 8.8 Zinc Plate (Gas Strut)	8
38	45158	M10 Heavy Duty Washer (Gas Strut)	16
39	45130	M10 Nut (Gas Strut)	8
40	45654	M10 Dome Nut Stainless	8
41	60190	Box Strap	2
42	45645	T Pull Rubber Rope	4
43	45646	Hook for Rubber Tensioner	4
44	45661ss	M10 x 50 SS Button Head Screw	4
45	45633	M4 x 25 Pan Head Screw	4
46	45632	M4 Nyloc Nut	4
47	Refer Table Below	Weather Skirts (Not Shown)	2
48	Refer Table Below	Transfer MK4 Renovator	4
49	60190P	Box Strap Bracket	2
50	43381	Metering Housing Outlet Cover	16R=10, 20R=8

PART NUMBER FOR DIFFERENT WIDTH MACHINES

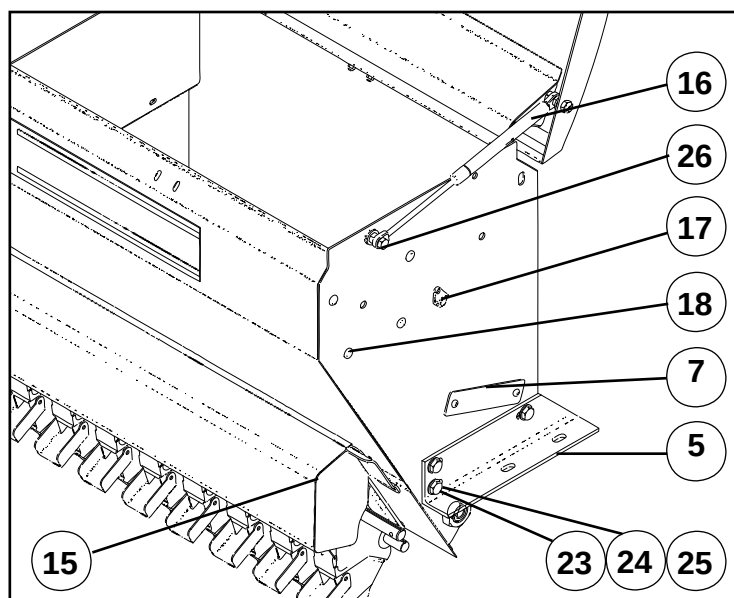
ITEM	DESCRIPTION	16R/21R 3.0m	24R 3.0m	20R/24R 3.5m	28R 3.5m
1	Box Only	60251	60101	60401	60301
2	Box with Lid	60260	60261	60262	60263
3	Lid Only	60120	60120	60320	60320
14	Box Shaft (20mm)	60148	60148	60146	60146
15	Flap Shaft (18mm)	60147	60147	60145	60145
19	Calibration Trays	LONG 60140/ SHORT 60138	60130	60144	60144
47	Weather Skirt	60240	60240	60242	60242
48	Transfer MK4	45640	45640	45641	45641

'Renovator' Seed Drill Single Seedbox Assembly

Refer to previous page for
gas strut and rubber latch
parts and fasteners



Location Tab Detail



'Renovator' Seed Drill Single Seedbox Assembly

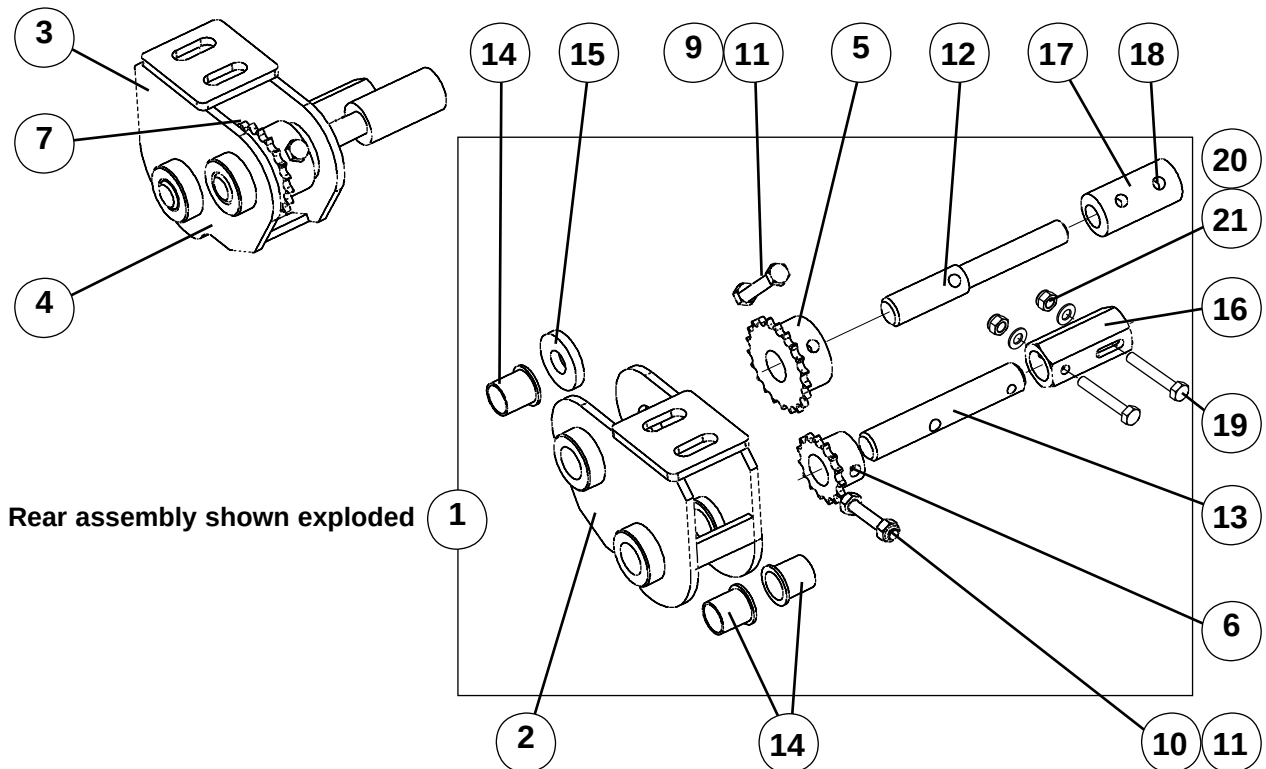
ITEM	PART No.	DESCRIPTION	QTY
1	Refer Table Below	Box Only	1
2	Refer Table Below	Box with Lid	1
3	Refer Table Below	Lid Only	1
4	25934	Box Set Mounting Bracket LH	1
5	25935	Box Set Mounting Bracket RH	1
6	60110PH	Rear Agitator Drive assy	1
7	22855#	Agitator Access Blanking Plate	1
8	10158	Rear Box Reverse Quadrant Plate	1
9	Refer Page 65	Seeder Assembly	16, 20, 21, 24, 28
10	22419#	Box Shaft Connecting Sleeve	1
11	Refer Table Below	Box Shaft (20mm)	1
12	Refer Table Below	Flap Shaft (18mm)	1
13	60098	Rear Flapshaft Handle w/assy	1
14	22568	Location Tab (Calibration Tray)	3
15	Refer Table Below	Calibration Tray	2
16	45644	Gas Strut Mk4	2
17	43430	Lashing Hook	2
18	14442	Rubber Body Plug	8
19	29163	Hinge Assembly	3
20	22491	Hinge Pin	3
21	27599	Hinge Pin Spring Clip	3
22	43373	Black Edge Trim	1
23	45019s	M12 x 30 Set Screw Class 8.8 Zinc Plate	8
24	45153	M12 Light Flat Washer	16
25	45139	M12 Nyloc Nut	8
26	45186	M10 x 12 Socket Head Grubscrew	2
27	45758	M6 x 16 Zinc Plated Countersunk Posidrive Screw	2
28	45908	M6 x 16 Zinc Plated Pan Head Machine Screw	11
29	45907	M6 x 12 Zinc Plated Pan Head Machine Screw	3
30	45122	M6 Class 8.8 Zinc Plated Hex Nut	3
31	45136	M6 Nylock Nut	14
32	45150	M6 Zinc Plated Light Flat Washer	12
33	Refer Table Below	Weather Skirt (Not Shown)	1
34	Refer Table Below	Transfer MK4 Renovator	2
35	43381	Metering Housing Outlet Cover	16R=5, 20R=4

PART NUMBER FOR DIFFERENT WIDTH MACHINES

ITEM	DESCRIPTION	169R/21R 3.0m	24R 3.0m	20R/24R 3.5m	28R 3.5m
1	Box Only	60251	60101	60401	60301
2	Box with Lid	60260	60261	60262	60263
3	Lid Only	60120	60120	60320	60320
14	Box Shaft (20mm)	60148	60148	60146	60146
15	Flap Shaft (18mm)	60147	60147	60145	60145
19	Calibration Trays	LONG 60130/ SHORT 60138	60130	60144	60144
33	Weather Skirt	60240	60240	60242	60242
34	Transfer Mk4	45640	45640	45641	45641

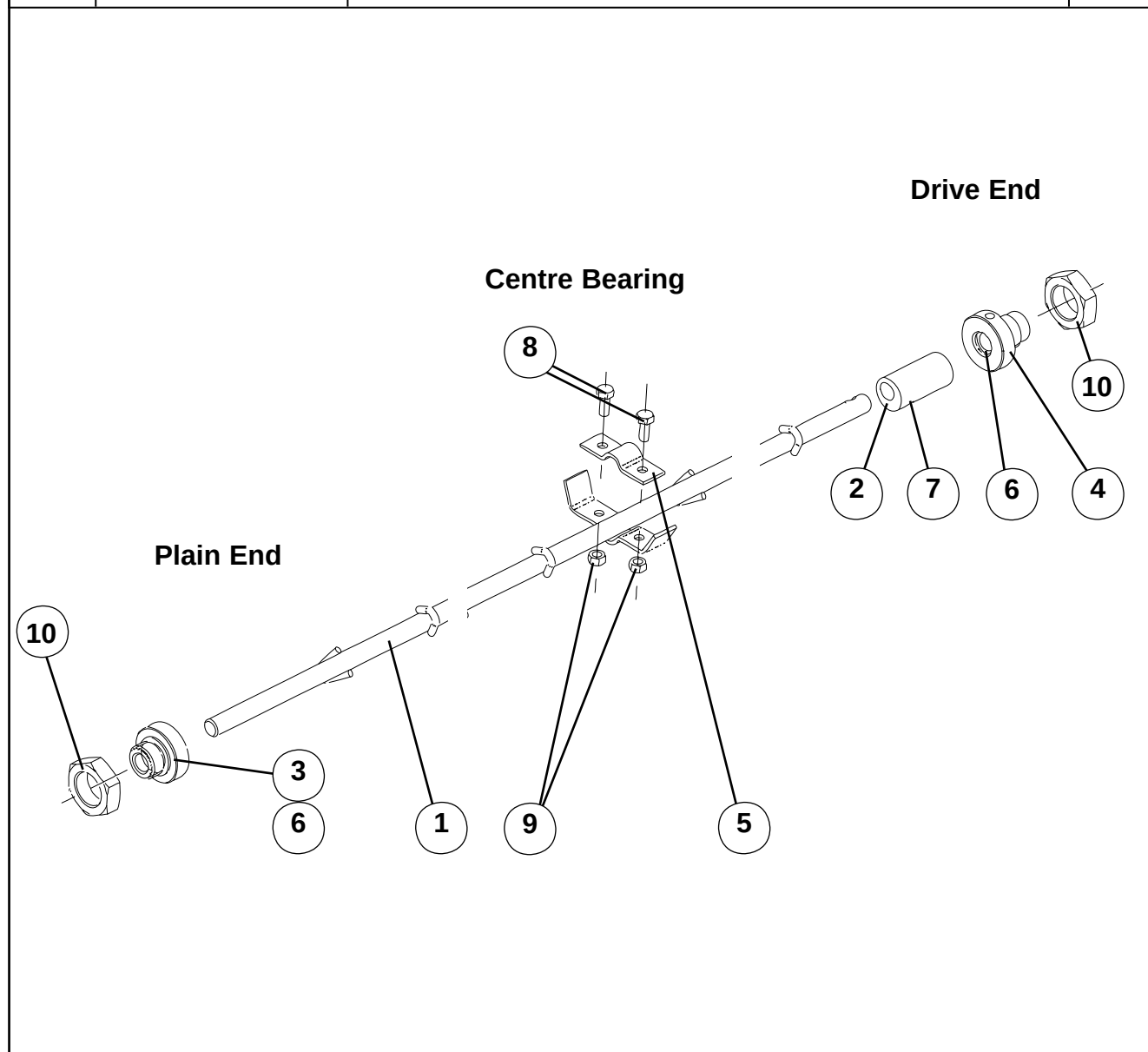
'Renovator' Seed Drill Agitator Drives

ITEM	PART No.	DESCRIPTION	QTY
1	60110PH	Agitator Drive Rear Housing complete with internals	1
2	60110	Rear Housing only	1
3	60118PH	Agitator Drive Front Housing complete with internals	1
4	60118	Front Housing only	1
5	22418	3/8" Pitch x 20mm Bore 21T Sprocket	2
6	22422	3/8" Pitch x 20mm Bore 15T Sprocket	2
7	22417	3/8" Pitch x 33 Link BS Chain	2
8	43396	3/8" Pitch Joiner Link	2
9	44968	M8 x 60 Class 8.8 Zinc Plated Bolt	2
10	44965	M8 x 45 Class 8.8 Zinc Plated Bolt	2
11	45137	M8 Nylock Nut	4
12	22425	Agitator Shaft Extension	2
13	22426	Seed Shaft Extension	2
14	43428	Nylon Bush	6
15	22416	Agitator Drive Spacer	2
16	22419	Box Shaft Connecting Sleeve	2
17	22420	Agitator Shaft Joining Collar	2
18	45180SS	M8 x 10 Stainless Steel Socket Head Grub Screw	4
19	44956SS	M6 x 40 Bolt S/Steel	4
20	45136SS	M6 Nyloc Nut S/Steel	4
21	45150SS	M6 Light Flat Washer	4



'Renovator' Seed Drill Agitator Shaft Assembly

ITEM	PART No.	DESCRIPTION	QTY
1	Refer Below	Agitator Shaft Assembly	1
2	22420	16mm Agitator Joining Collar	2
3	22423	Agitator Shaft Support RH (Short)	2
4	22424	Agitator Shaft Support LH (Long)	2
5	22428	Agitator Shaft Support Cap	2
6	43442	5/8" Lurethane Wiper Seal	4
7	45185SS	M10 x 10 Stainless Steel Socket Head Grubscrew	4
8	45410SSS	M8 x 16 Grade 316 Stainless Steel Set Screw	4
9	45137SS	M8 Grade 316 Stainless Steel Nylock Nut	4
10	47600	M30 ISO Fine Zinc Plated Hex Lock Nut	4

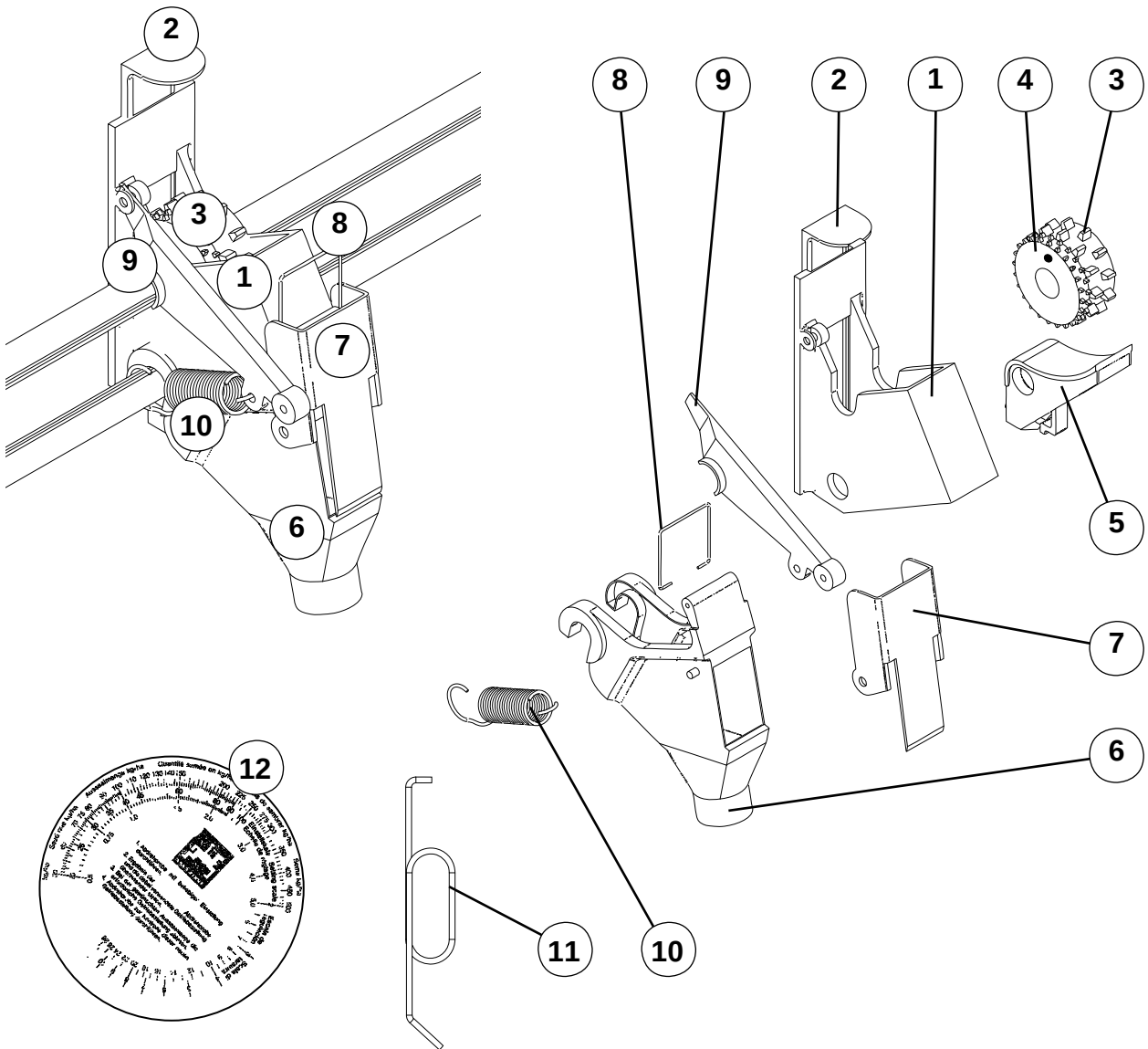


PART NUMBER FOR DIFFERENT WIDTH MACHINES

ITEM	DESCRIPTION	16R/21R 3.0m	24R 3.0m	20R/24R 3.5m	28R 3.5m
1	Agitator Shaft	60183	60181	60186	60184

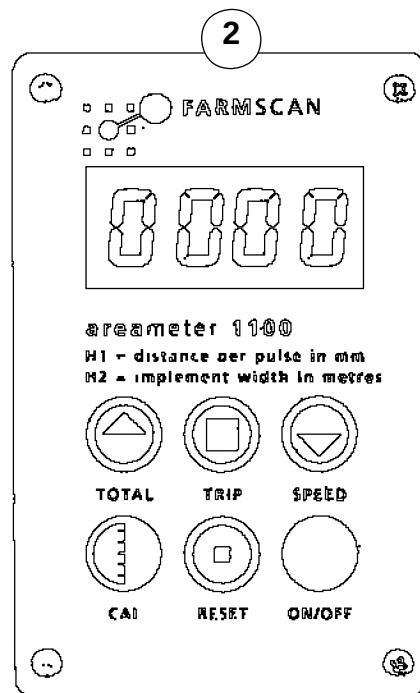
‘Renovator’ Seed Drill Seeder Mechanism

ITEM	PART No.	DESCRIPTION	QTY
1	43375	Metering Housing	20 to 56
2	43376	Shutter Slide	20 to 56
3	43377	Seed Metering Wheel Assembly (Includes item 4)	20 to 56
4	43374	Fine Seed Wheel (For Spares Ordering Only)	-
5	43378	Bottom Flap & Bolt Assembly	20 to 56
6	22550	Seeder Extension Funnel	20 to 56
7	22551	Seed Diverter	20 to 56
8	22548	Spring Clip, S/S	20 to 56
9	43379	Seed Shaft Guide Bearing	6
10	43380	Guide Bearing Tension Spring	6
11	43382	Metering Wheel Clutch Hook	1
12	43383	Seed Rate Disc Calculator	1
13	43362	Fine Seed Wheel Brush (Optional Extra)	-

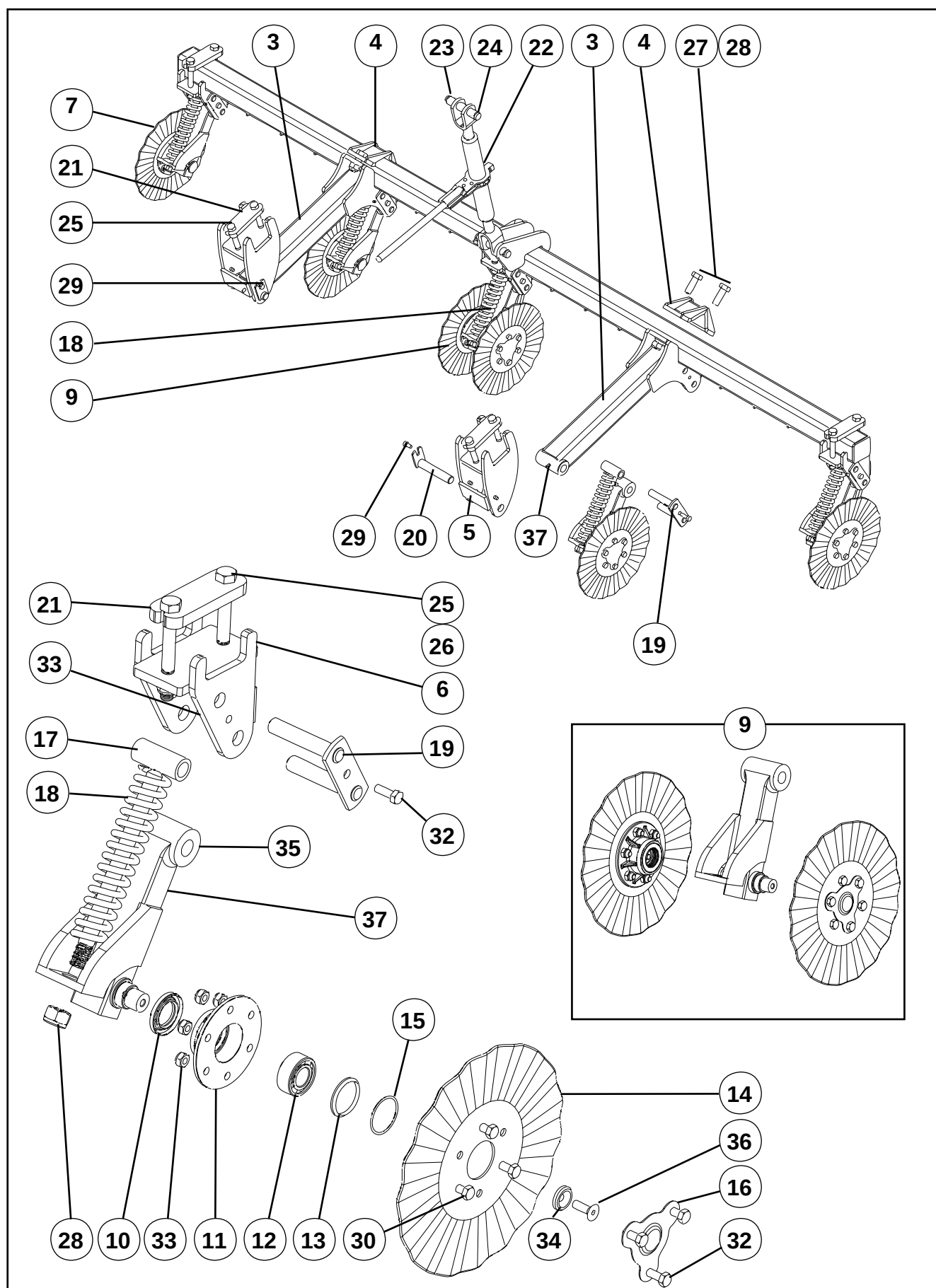


'Renovator' Seed Drill Hectaremeter Kit

ITEM	PART No.	DESCRIPTION	QTY
1	43409	Hectaremeter Kit, (Includes items 2 to 7)	1
2	43400	Hectaremeter	1
3	43408	Manual, Hectaremeter	1
4	43404	Magnet and Clamp	1
5	43403	Sensor	1
6	43453	Hectaremeter Cable	1
7	43461	Cable, Recharging	1
8	43455	Electronic Scales	1
9	43456	Calculator	1
10	43457	Sealtop Plastic Container	1



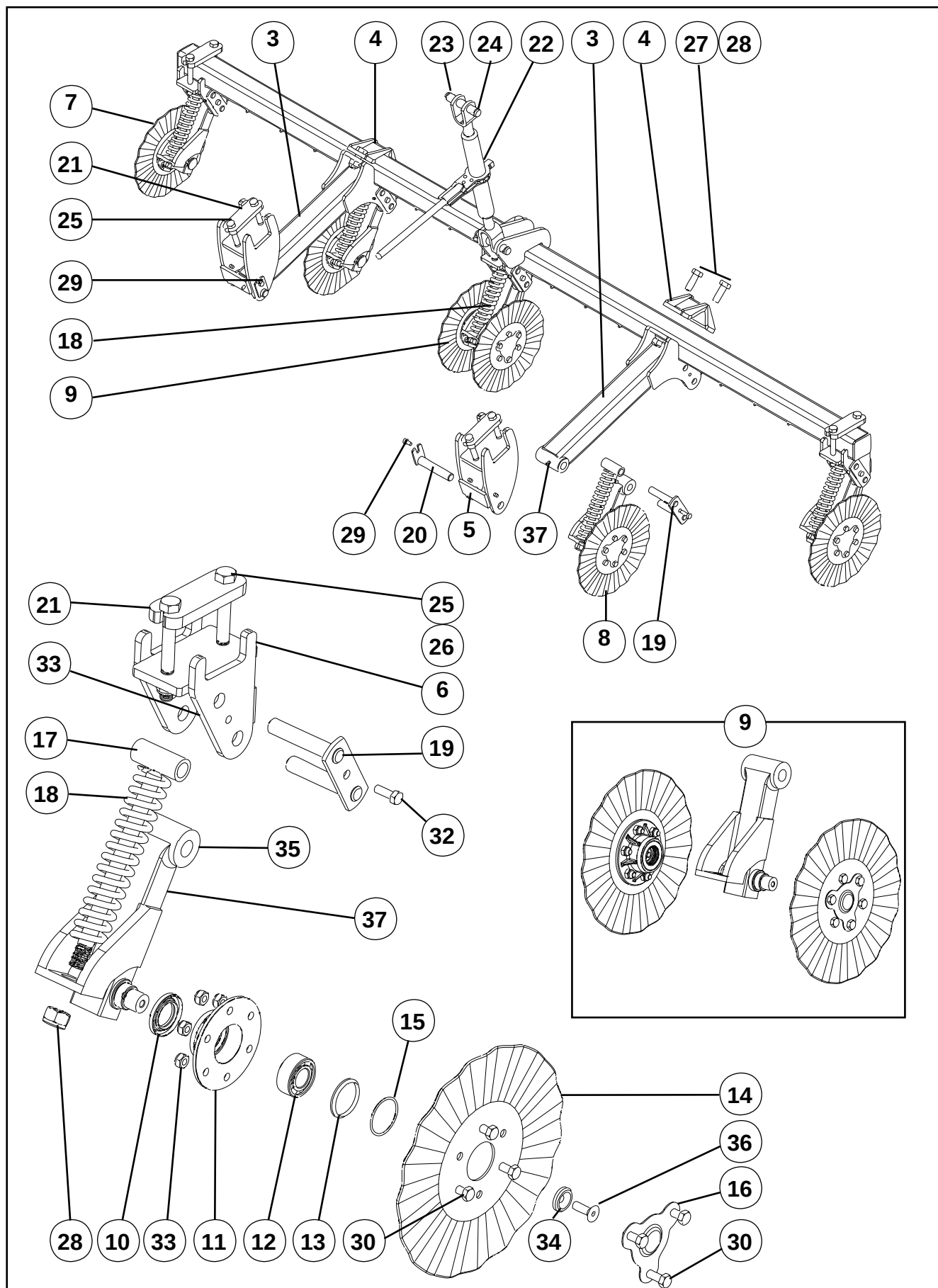
'Renovator' Seed Drill Disc Opener 21, 24, 28R



'Renovator' Seed Drill Disc Opener 21, 24, 28R

ITEM	PART No.	DESCRIPTION	QTY		
1	Refer Below	Disc Opener Complete	1		
2	Refer Below	Disc Opener Frame	1		
3	60280	Pivot Arm	2		
4	60287	Angle Bracket	2		
5	60290	Frame Support	2		
6	60460	Mounting Bracket	20,23,27		
7	60452	Single Disc Assembly LH	9,11,13		
8	60453	Single Disc Assembly RH	10,11,13		
9	Refer Below	Double Disc Assembly	1		
10	45650	Seal	21,24,28		
11	60466	Housing	21,24,28		
12	45652	Bearing	21,24,28		
13	60469	Bearing Retainer	21,24,28		
14	22035	Fluted Disc 318mm Dia.	21,24,28		
15	45653	O Ring Seal	21,24,28		
16	60468	Cover Plate Stainless Steel	21,24,28		
17	26310	T Bolt Spring Rod	21,24,28		
18	60294	Disc Opener Spring	20,23,27		
19	60450	Double Pivot Pin Assembly	21,24,28		
20	60298	Attachment Arm Pivot	2		
21	21690	Clamp Plate	21,24,28		
22	43395	H/D Ratchet Turnbuckle	1		
23	47254	Bolt 1" UNF x 5" HT	2		
24	47552	1" UNF Nyloc Nut	4		
25	45051	M16 X 130 Class 8.8 Bolt	40,46,54		
26	45140	M16 Nyloc Nut	40,46,54		
27	45063	M20 x 55 Class 8.8 Bolt	4		
28	45141	M20 Nyloc Nut	24,27,31		
29	45001s	M10 x 20 Class 8.8 Set Screw	2		
30	45002s	M10 x 25 Class 8.8 Set Screw	126,144,168		
31	45166	M10 Spring Washer	2		
32	45004	M10 x 35 Class 8.8 Bolt	20,23,27		
33	45138	M10 Nyloc Nut	146,167,195		
34	60444	Bearing Retainer	21,24,28		
35	43118	Grease Nipple Straight	21,24,28		
36	45662	M10 x 30 CSK Screw	21,24,28		
37	Refer Below	Axle Arm	21,24,28		
PART NUMBER FOR DIFFERENT WIDTH MACHINES					
ITEM	DESCRIPTION	21R 3.0m	24R 3.0m	24R 3.5m	28R 3.5m
1	Disc Opener Complete	CR21WDO	CR24NDO	CS24WDO	CS28NDO
2	Disc Opener Frame	60274	60274	60272	60272
9	Double Disc Assy	60455	60454	60455	60454
37	Single Axle Arm	L=60456 R=60457	L=60456 R=60457	L=60456 R=60457	L=60456 R=60457
	ROW SPACING	147.5mm	125mm	147.5mm	125mm

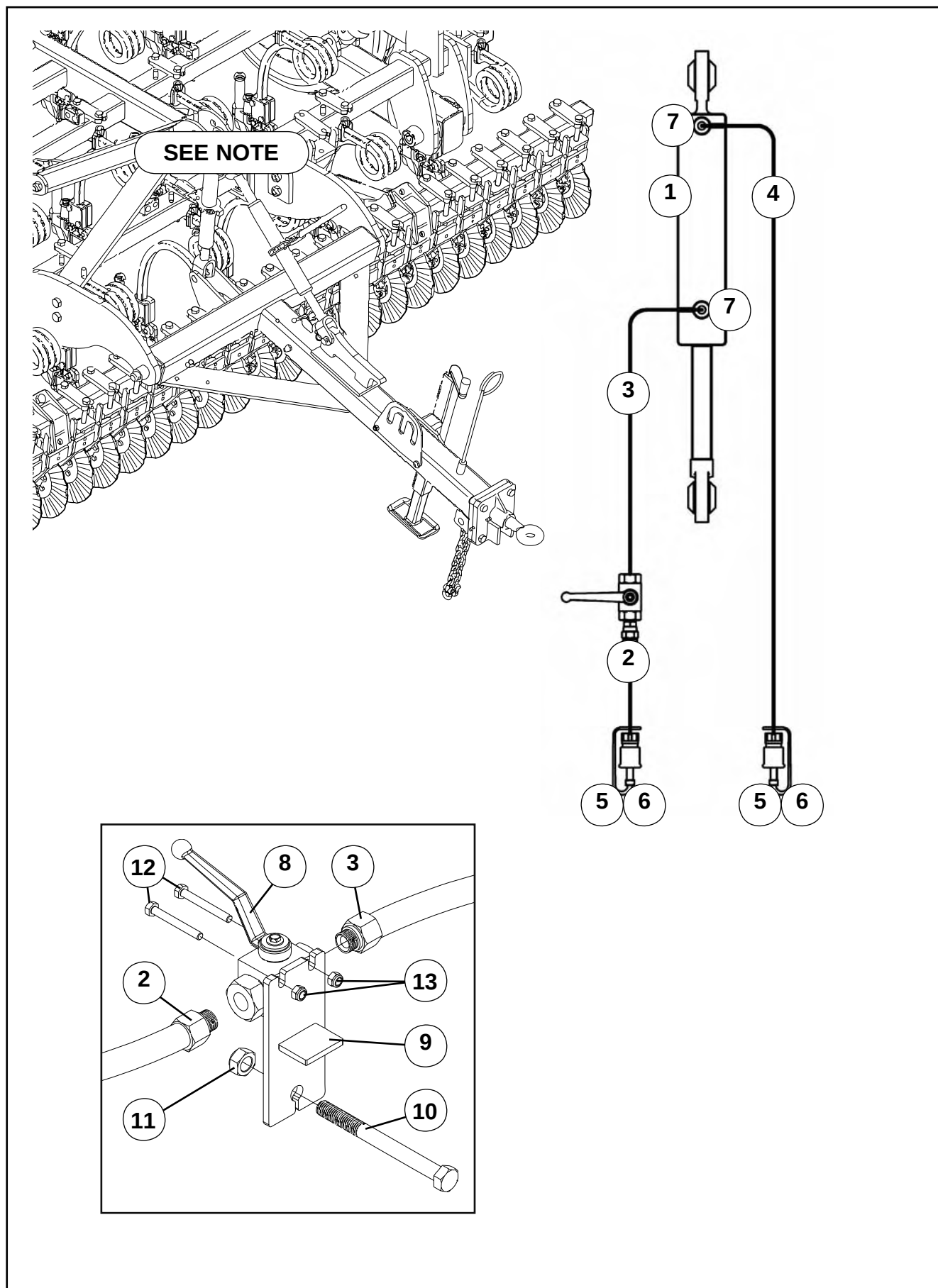
'Renovator' Seed Drill Disc Opener 16, 20R



'Renovator' Seed Drill Disc Opener 16, 20R

ITEM	PART No.	DESCRIPTION	QTY
1	Refer Below	Disc Opener Complete	1
2	Refer Below	Disc Opener Frame	1
3	60280	Pivot Arm	2
4	60287	Angle Bracket	2
5	60290	Frame Support	2
6	60460	Mounting Bracket	15, 19
7	60452	Single Disc Assembly LH	7, 9
8	60453	Single Disc Assembly RH	7, 9
9	Refer Below	Double Disc Assembly	1
10	45650	Seal	16, 20
11	60466	Housing	16, 20
12	45652	Bearing	16, 20
13	60469	Bearing Retainer	16, 20
14	22035	Fluted Disc 318mm Dia.	16, 20
15	45653	O Ring Seal	16, 20
16	60468	Cover Plate Stainless Steel	16, 20
17	26310	T Bolt Spring Rod	16, 20
18	60294	Disc Opener Spring	15, 19
19	60450	Double Pivot Pin Assembly	16, 20
20	60298	Attachment Arm Pivot	2
21	21690	Clamp Plate	16, 20
22	43395	H/D Ratchet Turnbuckle	1
23	47254	Bolt 1" UNF x 5" HT	2
24	47552	1" UNF Nyloc Nut	4
25	45051	M16 X 130 Class 8.8 Bolt	30, 38
26	45140	M16 Nyloc Nut	30, 38
27	45063	M20 x 55 Class 8.8 Bolt	4
28	45141	M20 Nyloc Nut	19, 23
29	45001s	M10 x 20 Class 8.8 Set Screw	2
30	45002s	M10 x 25 Class 8.8 Set Screw	96, 120
31	45166	M10 Spring Washer	2
32	45004	M10 x 35 Class 8.8 Bolt	15, 19
33	45138	M10 Nyloc Nut	111, 139
34	60444	Bearing Retainer	16, 20
35	43118	Grease Nipple Straight	16, 20
36	45662	M10 x 30 CSK Screw	16, 20
37	Refer Below	Axle Arm	16, 20
PART NUMBER FOR DIFFERENT WIDTH MACHINES			
ITEM	DESCRIPTION	16R 3.0m	20R 3.5m
1	Disc Opener Complete	CR16EWDO	CS20EWDO
2	Disc Opener Frame	60274	60272
9	Double Disc Assy	61274	
37	Single Axle Arm	L=60456 R=60457	
	ROW SPACING	180mm	

'Renovator' Seed Drill Disc Opener Hydraulics

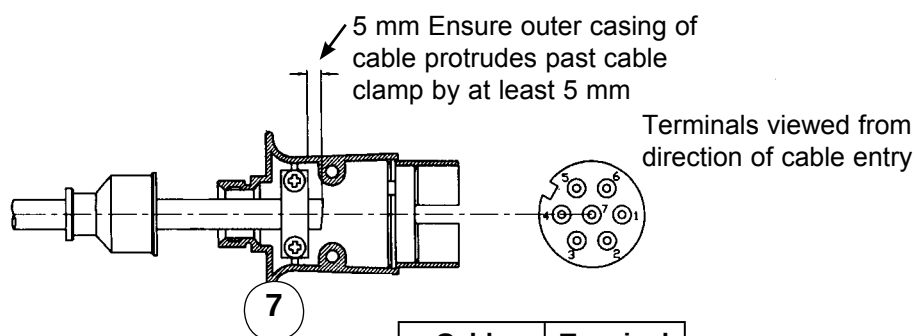
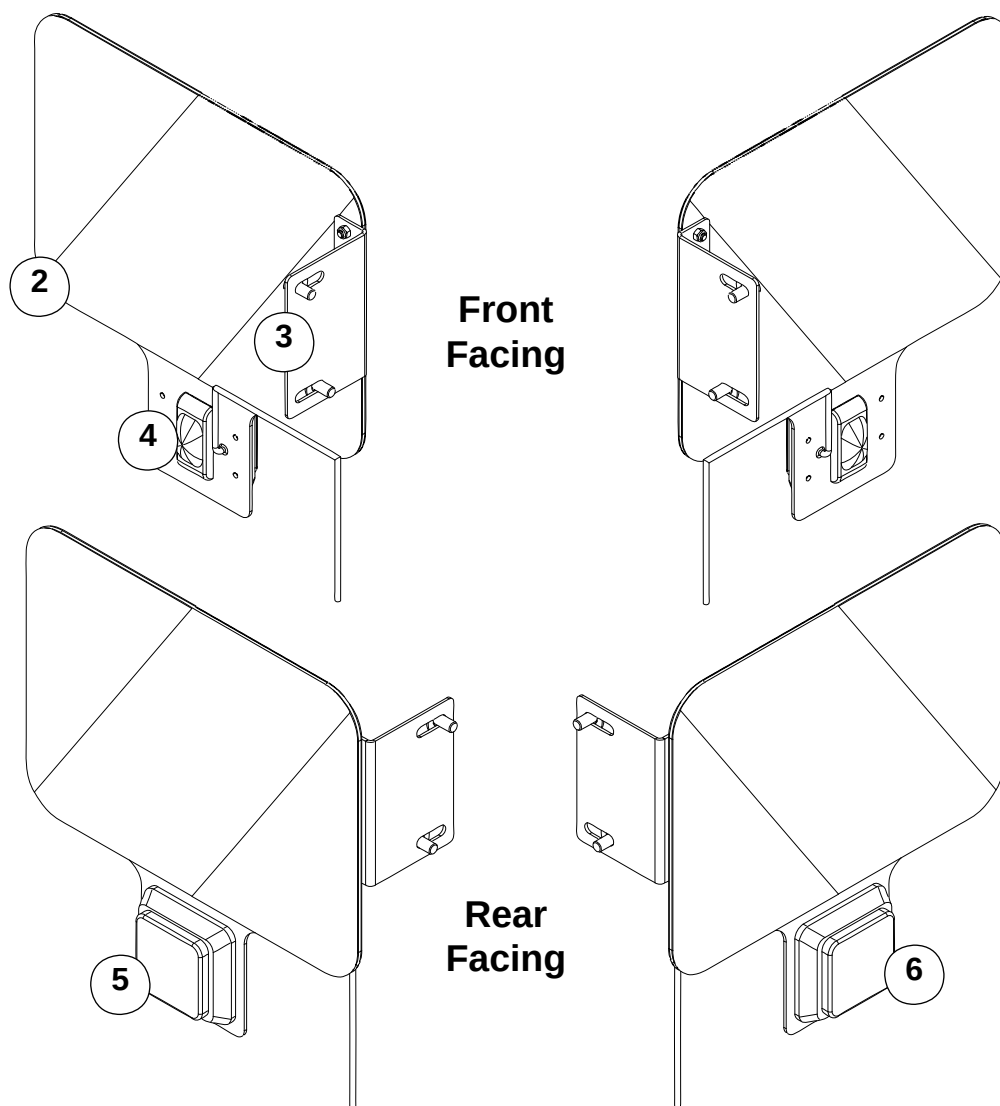


'Renovator' Seed Drill Disc Opener Hydraulics

ITEM	PART No.	DESCRIPTION	QTY
1	45655	Hydraulic Cylinder	1
2	60874	Hydraulic Hose 2.70m	1
3	26695	Hydraulic Hose 0.60m	1
4	26696	Hydraulic Hose 3.5m	1
5	43147	1/2" BSP Quick Release Coupling	2
6	43617	Dust Cover	2
7	43280	3/4" UNO to 3/8" BPSM Nipple	2
8	43393	3/8" BSP S/S Ball Valve	1
9	60856	Hydraulic Valve Support Assembly	1
10	45035	M12 x 140 Grade 8.8 Bolt	1
11	45139	M12 Nyloc Nut	1
12	44957	M6 x 50 Bolt	2
13	45136	M6 Nyloc Nut	2
14	47254	1.0 UNF X 5.0" HT Bolt	2
15	47552	1.0"UNF Nyloc Nut	2

NOTE: Items 1 to 13 may be ordered as a kit. Part number 60076K

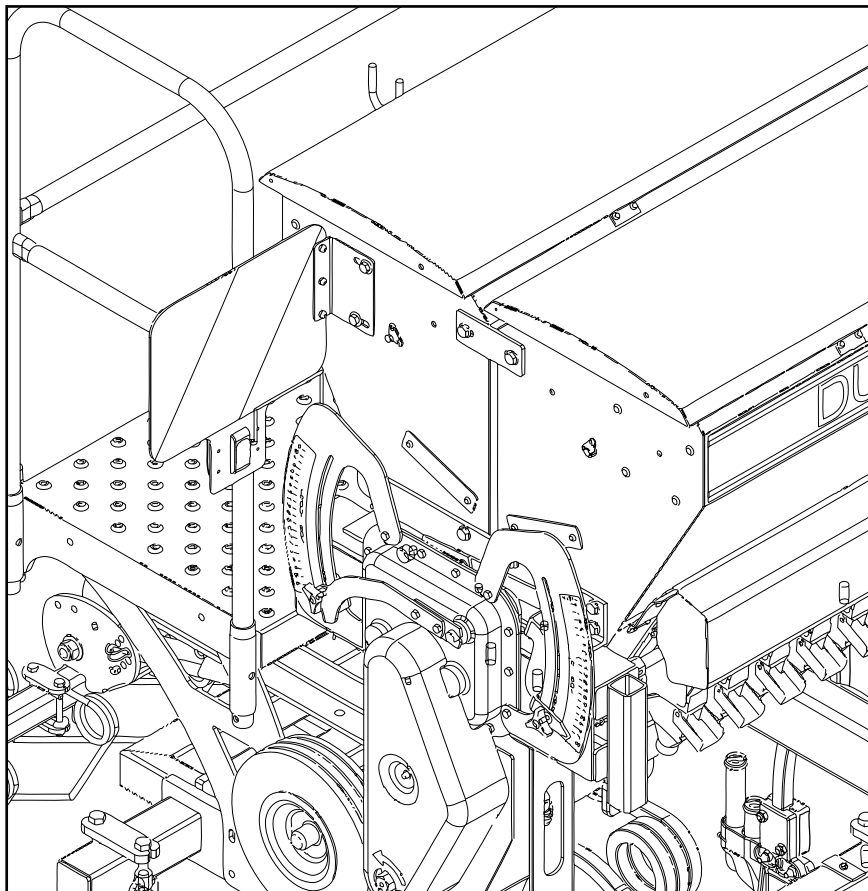
'Renovator' Seed Drill Wiring & Lighting (Optional)



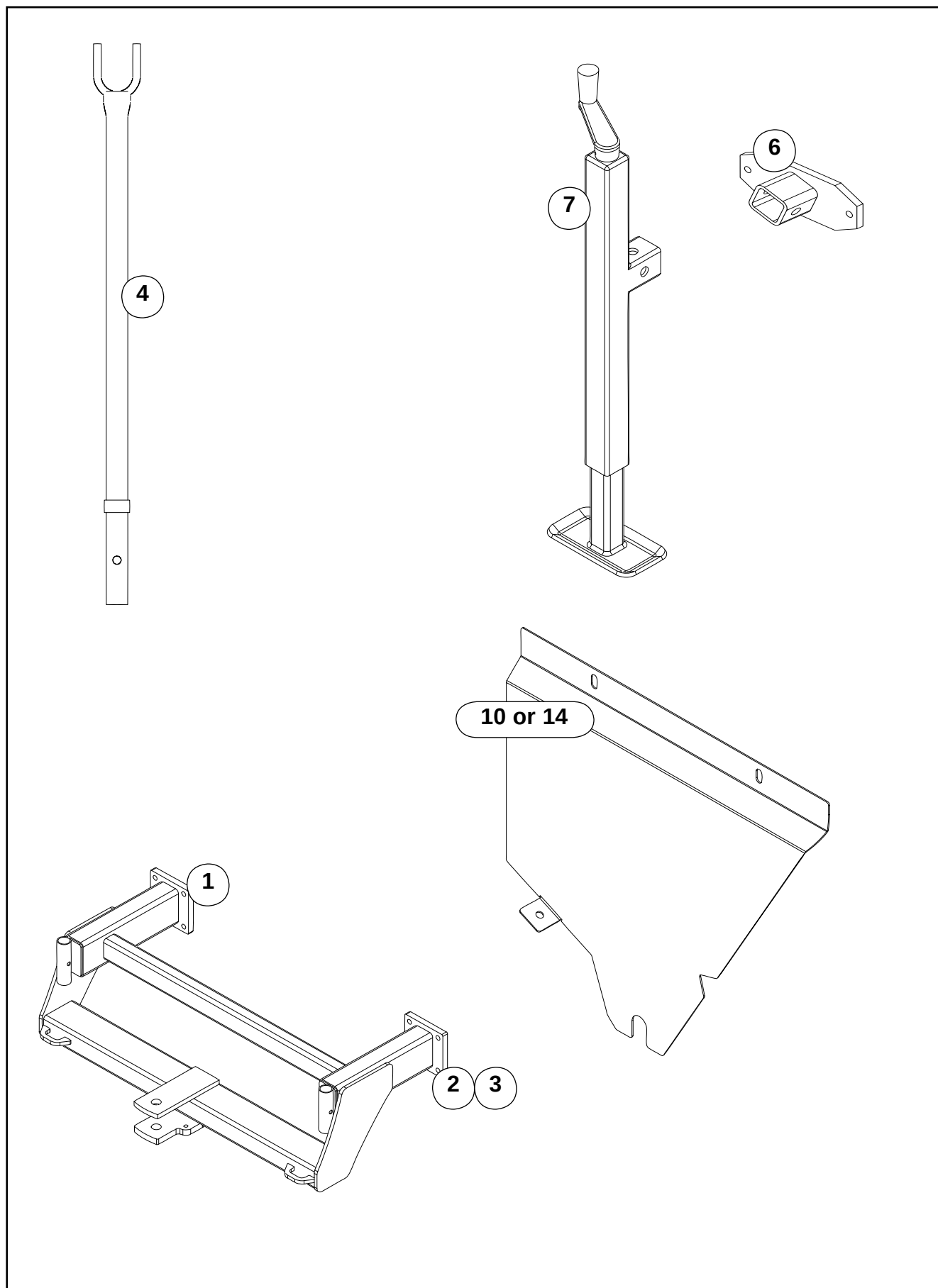
Cable Colour	Terminal Number
Yellow	1
White	3
Green	4
Red	6
Brown	7

'Renovator' Seed Drill Wiring & Lighting (Optional)

ITEM	PART No.	DESCRIPTION	QTY
1	60885k	Complete Transport Visibility Kit	1
2	60891P	Hazard Panel Profile	2
3	60892#	Lamp Bracket	2
4	45666	LED Amber Marker Multivolt	2
5	45667	LED Combo Tail Lamp (Long Lead)	1
6	45668	LED Combo Tail Lamp (Short Lead)	1
7	43437	Trailer Round Connect	1
8	45001S	M10 X 20 GR8.8 Z/P Bolt	4
9	45138	M10 Nyloc Nut	4
10	45152	M10 Light Flat Washer	4
11	44951S	M6 X 16 GR8.8 Z/P Bolt	6
12	45150	M6 Light Flat Washer	6
13	45136	M6 Nyloc Nut	6
14	43333	Plastic Tie Strap	9
15	45702	Pop Rivet	9
16	43930	Cable Clip	9
17	45664	Hazard Decal Full Set	1

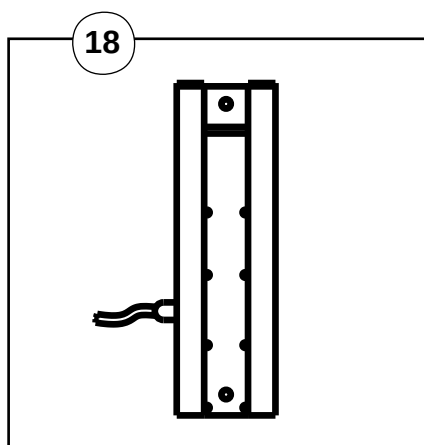


'Renovator' Optional Extras

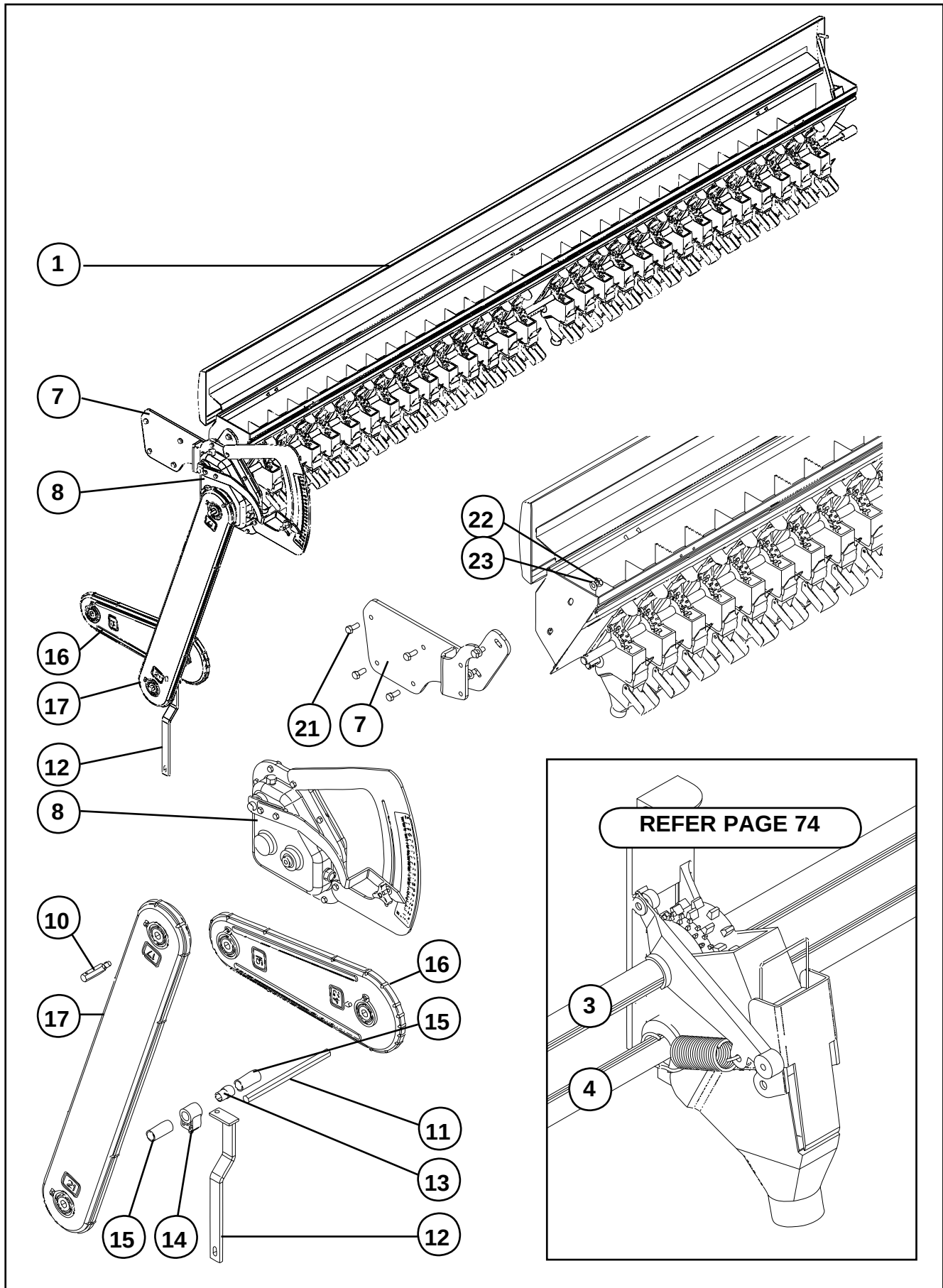


‘Renovator’ Optional Extras

ITEM	PART No.	DESCRIPTION	QTY
1	60067k	Rear Tow Hitch Assembly	1
2	45042	M16 x 60 Bolt Grade 8.8 Z/P	8
3	45140	M16 Nyloc Nut	8
	26852k	Harrow Transport Kit (Items 2 to 3)	
4	26003	Harrow Transport Support Assembly	2
5	19199	Shaft Locking Pin (Not Shown)	4
	26850k	Jack Stand Kit (Items 4 to 7)	
6	26809	Jack Support Bracket	1
7	31478	Jack	1
8	45034	M12x130mm Grade 8.8 Bolt (Not shown)	2
9	45139	M12 Nyloc Nut (Not shown)	2
	60156k	Baffle Extension Kit (Items 8 to 11)	1 kit/box
10	601157	Box Baffle Extension	3
11	45410S	M8x16 Bolt (Not shown)	9
12	45137	M8 Nyloc (Not shown)	9
13	45151	M8 Light Flat Washer (Not shown)	18
	60156SSk	Baffle Extension Kit Stainless (Items 12 to 15)	1 kit/box
14	601157	Box Baffle Extension SS	3
15	45410SSS	M8x16 Stainless Steel Bolt (Not shown)	9
16	45137SS	M8 Stainless Steel Nyloc (Not shown)	9
17	45151SS	M8 SS Light Flat Washer (Not shown)	18
18	26858k	Optical Seed Level Indicator	1
19	60886K	Tine Stub Kit (3.5M)	1



'Renovator' Small Seeds Box (Optional)



‘Renovator’ Small Seeds Box (Optional)

ITEM	PART No.	DESCRIPTION	QTY
1	See Below	Small Seeds Box for Renovator MK4	1
2	See Below	Small Seeds Box and Lid only (no components)	1
3	See Below	Small Seeds Box Shaft	1
4	See Below	Small Seeds Flap Shaft	1
5	See Below	Weather Skirt Holder	1
6	See Below	Edge Trim	-
7	60377	Small Seeds Box Mounting Bracket W/Assy	1
8	Refer Page 95	Small Seeds Gearbox	1
9	23633#	Box Shaft Short Connecting Sleeve	1
10	26780	Hexagonal Drive Shaft (Small Box) Left Hand Thread	1
11	60348	Hexagonal Transfer Drive Shaft	1
12	60345	Cassette Support Bracket W/Assembly	1
13	43855	Drive Cassette Support Bearing (Fiona)	1
14	43856	Drive Cassette Support Housing (Fiona)	1
15	60344	Cassette Drive Spacer	2
16	43857	Drive Cassette 42/15T (Fiona)	1
17	45657	Drive Cassette 21/17T (Long) (Fiona)	1
18	43430	Plastic Lashing Hook	1
19	45271	R Clip	3
20	45155	M20 Light Flat Washer	3
21	45003S	M10x25 Grade 8.8 Z/P Bolt	13
22	45152	M10 Light Flat Washer	17
23	45138	M10 Nyloc Nut	13

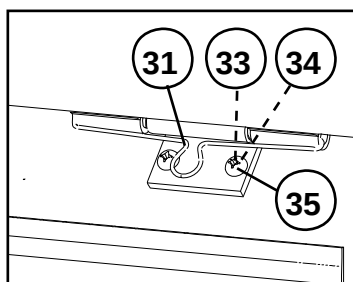
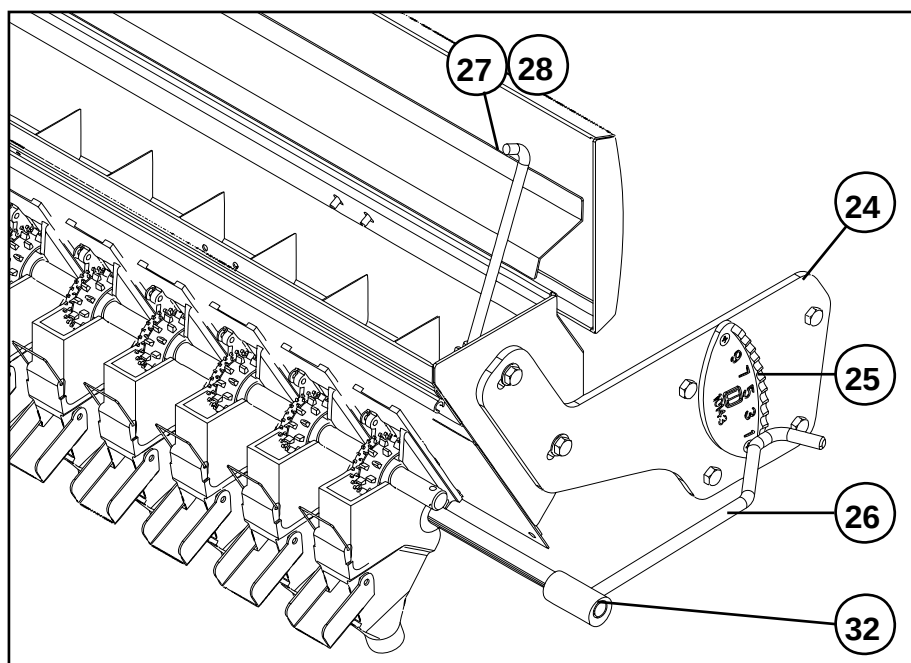
Parts List continued on next page...

PART NUMBER FOR DIFFERENT WIDTH MACHINES

ITEM	DESCRIPTION	16R 3.0m	21R 3.0m	24R 3.0m	20R 3.5m	24R 3.5m	28R 3.5m
1	Small Seeds Box complete kit	CW3016EW	CW3021W	CW3024N	CW3520EW	CW3524W	CW3528N
2	Box and Lid only	60376		60374	60372		60370
3	Box Shaft (20mm)	60414			29560		
4	Flap Shaft (18mm)	60415			29561		
5	Weather Skirt Holder	60241			60243		
6	Edge Trim	43373 2.4m			43373 2.9m		

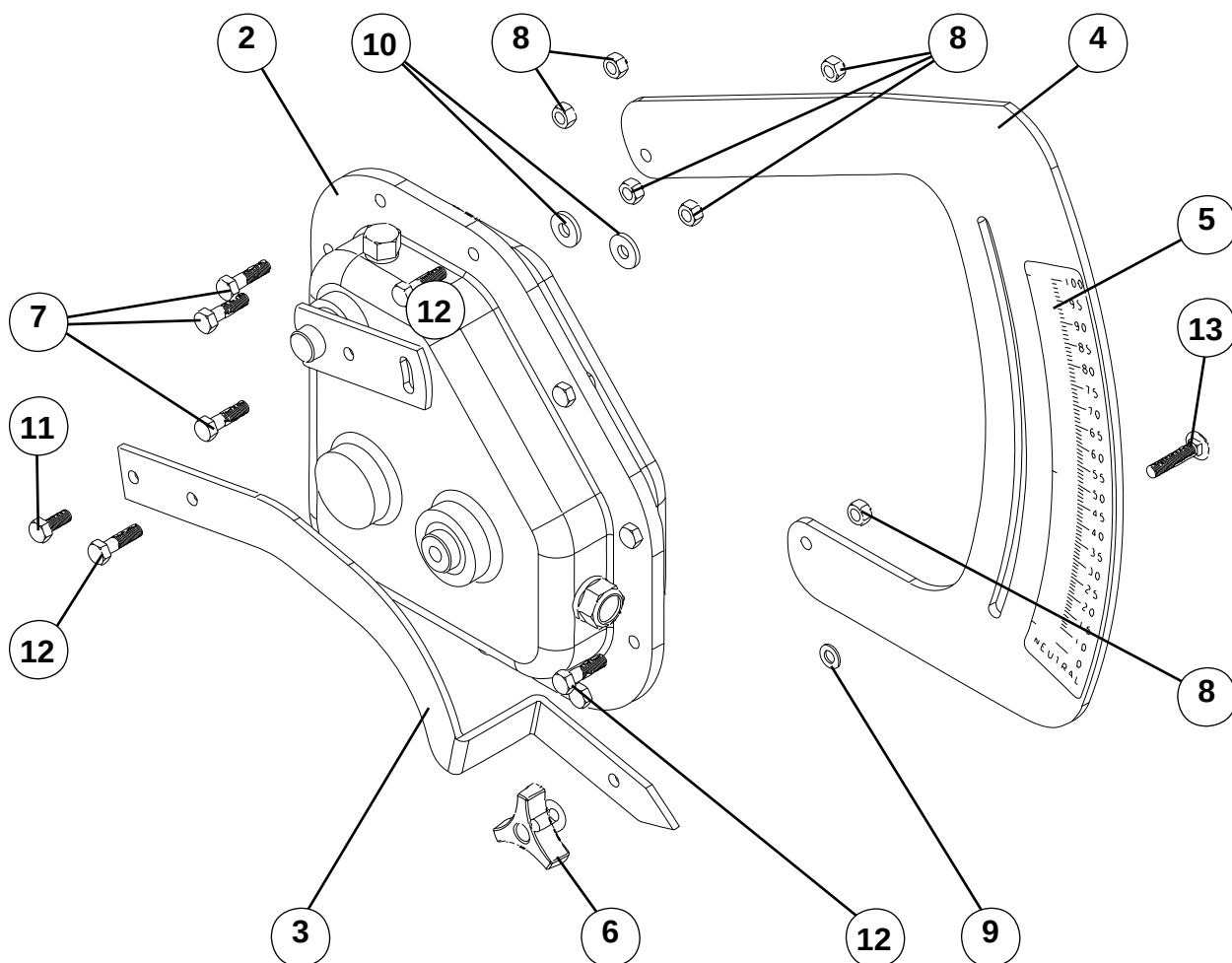
‘Renovator’ Small Seeds Box (Optional)

ITEM	PART No.	DESCRIPTION	QTY
24	60368	Small Seeds Box Mounting Plate	1
25	10143	Fertilizer Quadrant Plate	1
26	23732	Eclipse Flap Handle Assembly	2
27	23679	Lid Stay rod	3
28	23678	Lid Stay Pivot Assembly	2
29	45645	Rubber Latch Renovator mk4	1
30	45646	Rubber Latch Hook mk4	1
31	27599	Hinge Pin Spring Clip	1
32	45186	M10x12 Socket Head Grub Screw	2
33	45136	M6 Nyloc Nut	4
34	45150	M6 Light Flat washer	6
35	45908	M6 x 16 Pan Posi	6
36	43381	Metering Housing Outlet Cover	16R=5, 20R=4

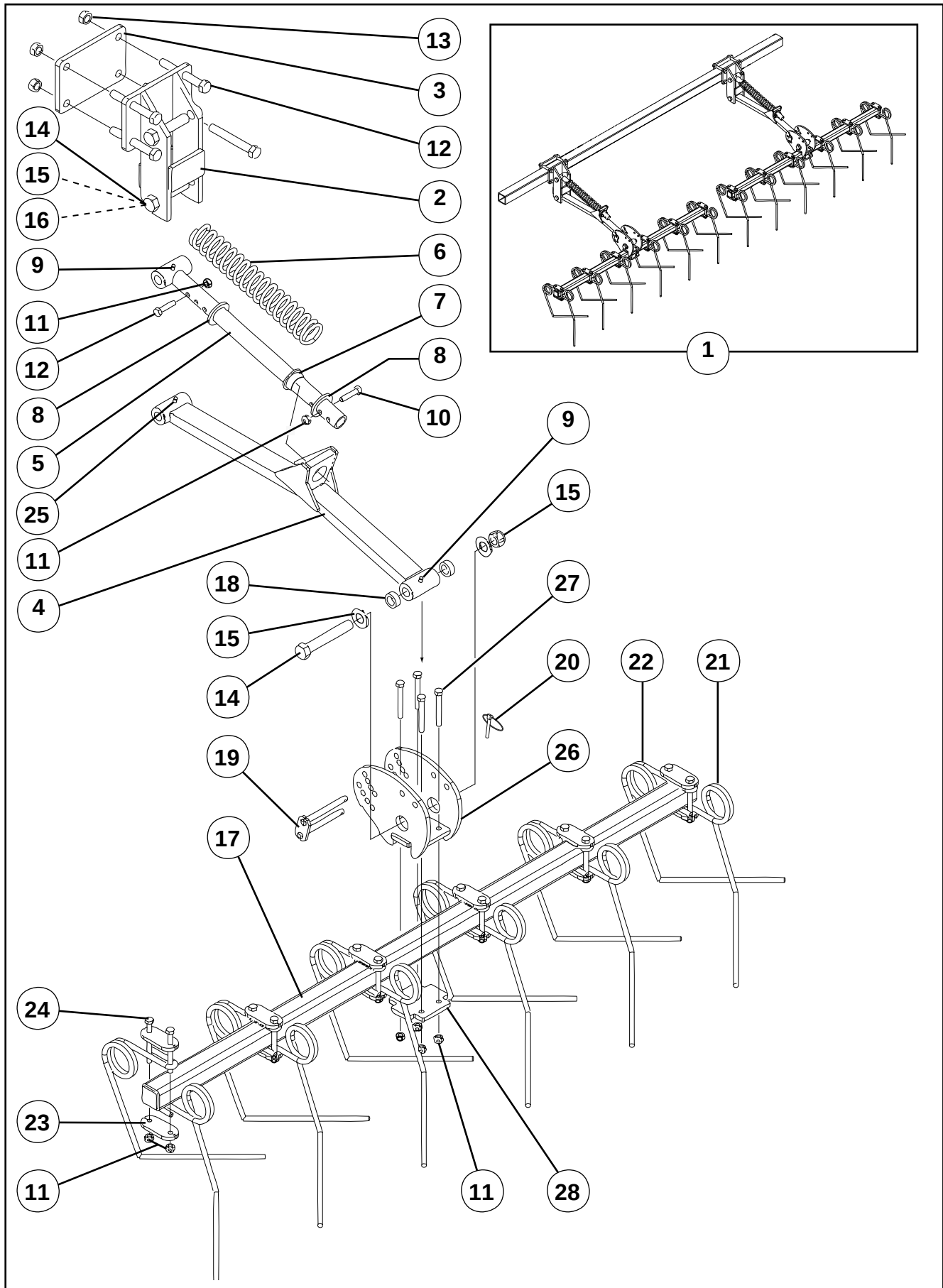


‘Renovator’ Small Seeds Box (Optional)

ITEM	PART No.	DESCRIPTION	QTY
1	26790	Small Seeds Gearbox Complete (items 2 to 13)	1
2	26792	Small Seeds Gearbox Sub Assembly	1
3	23615	Gearbox Speed Adjustment Lever	1
4	23616	Gearbox Quadrant	1
5	23621	Gearbox Speed Scale	1
6	43366	Tri Knob	1
7	44963	M8x35 Grade 8.8 Bolt	3
8	45137	M8 Nyloc Nut	7
9	45151	M8 Light Flat Washer	1
10	45157	M8 H/D Flat Washer	2
11	44992s	M8x20 Grade 8.8 Z/P S/Screw	1
12	44993s	M8x25 Grade 8.8 Z/P S/Screw	3
13	47031	M8x30 Grade 4.6 Cup Head Bolt	1



'Renovator' Tine Harrow (Optional)



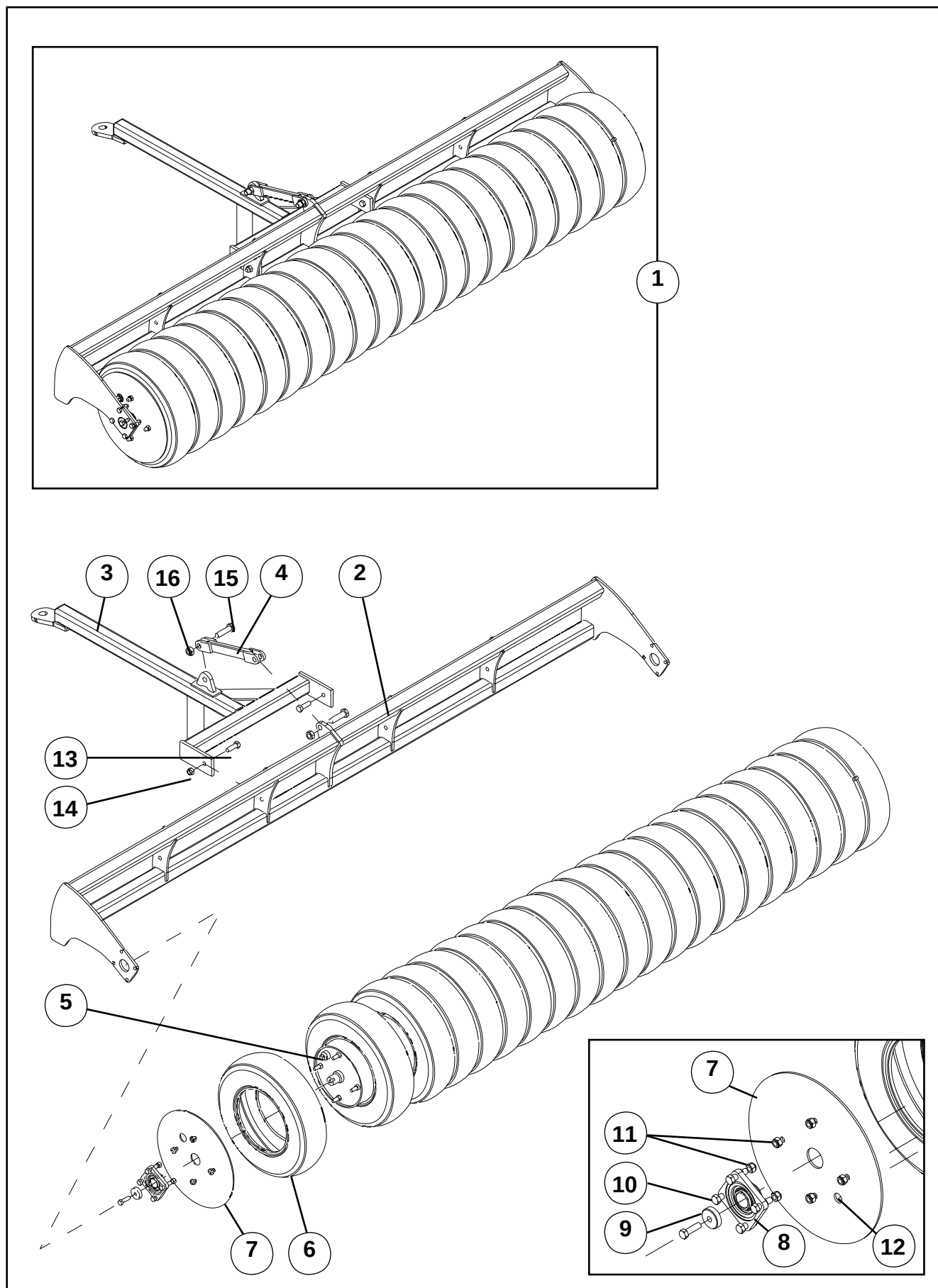
‘Renovator’ Tine Harrow (Optional)

ITEM	PART No.	DESCRIPTION	QTY
1	See Below	Tine Harrow for MK4 Renovator	1
2	60426	Tine Harrow Strut W/Assy	2
3	60428	Strut Bolt Plate	2
4	60430	Swinging Arm W/Assy	2
5	60435	Guidingbar W/assy	2
6	60437	Levelling Harrow Spring	2
7	60438	Guiding bar Bush	2
8	60439	Guiding Spacer	4
9	43118	Grease Nipple Straight	2
10	45006	M10 X 45 Gr 8.8 bolt Z/P	4
11	45138	M10 Nyloc Nut	36
12	45050	M16 X 120 Gr 8.8 bolt Z/P	8
13	45140	M16 Nyloc Nut	8
14	45073	M20 X 130 Gr 8.8 bolt Z/P	6
15	45161	M20 HD flat washer Z/P	4
16	45141	M20 Nyloc Nut	6
17	See Below	Levelling Harrow Bar W/Assy	2
18	60440	Swinging Bracket Spacer	4
19	60441	Levelling Harrow Pivot Pin W/Assy	2
20	43675	1/4" x 1 1/2" Lynch Pin	2
21	60255	Levelling Harrow Tine -LH	12
22	60256	Levelling Harrow Tine -RH	12
23	60422P#	Double Retaining Plate Profile	24
24	45016	M10 X 100 Gr8.8 Bolt Z/P	24
25	43120	Grease Nipple 90°	2
26	60421	Tine Harrow Bracket	2
27	45013	M10 x 80 Gr 8.8 bolt Z/P	8
28	60420	Harrow Bar Clamp Plate	2

PART NUMBER FOR DIFFERENT WIDTH MACHINES

ITEM	DESCRIPTION	16R/21R 3.0m	24R 3.0m	20R/24R 3.5m	28R 3.5m
1	Tine Harrow Complete	RFT30		RFT35	
19	Harrow Bar Welded Assy	60423		60424	

'Renovator' Uni-Roller (Optional)



'Renovator' Uni-Roller (Optional)

ITEM	PART No.	DESCRIPTION	QTY
1	See Below	Uni-Roller Complete	1
2	See Below	Roller Frame W/Assy	1
3	60490	Drawbar Assembly Complete	1
4	60496	Link	1
5	See Below	Roller Tube W/Assy	1
6	43589	Tyre 185/70 R13	18/21
7	60494	End Retaining Plate	2
8	43588	Bearing Unit	2
9	60495	Roller Axle Retainer	2
10	45041	M16 x 55 Class 8.8 Z/P Bolt	10
11	45140	M16 Nyloc Nut	16
12	43271	Drain plug	2
13	45064	M20 x 65 Class 8.8 Z/P Bolt	2
14	45141	M20 Nyloc Nut	2
15	47251	Bolt 1"UNF x 3.5" HT	2
16	47552	Nut 1" UNF Nyloc	2

PART NUMBER FOR DIFFERENT WIDTH MACHINES					
ITEM	DESCRIPTION	16R/21R 3.0m	24R 3.0m	20R/24R 3.5m	28R 3.5m
1	Uni-Roller Complete	RTR30		RTR35	
2	Roller Frame	60475		60476	
5	Roller Tube W/Assy	60482		60483	



CEproof.

CEproof International Limited
Hilliard House
Laster Way
Wallingford
Oxfordshire OX10 9TA
UNITED KINGDOM

EC DECLARATION OF CONFORMITY

Description of Machine: Agricultural Seed Drill Machine

Make / Model: Renovator Mk4

Type: Renovator 21, 24, 28 row / Disc opener

Serial Numbers: EU CRA to CRF 000001-100000
EU CSA to CSF 000001-100000

Name of Manufacturer: CLOUGH AGRICULTURE LTD

Address: 100 Hilton Highway
Washdyke
Timaru 7910
New Zealand

We hereby declare that the product described above complies with the relevant provisions of the appropriate EC Directives and Harmonised Standards of the European Union listed below and accordingly carries CE-marking.

Machinery Directive 98/37/EC

The following Standards are applicable:

- EN 294 : 1992
- BS EN 982: 1996
- AS/NZS 2153: 1997
- AS/NZS 1657: 1992
- BS 1841-1:1996 / ISO 730-1: 1994
- BS 5499-1: 2002
- EN ISO 12100-2 2003

Date of Declaration: 29th April 2009

Date of Issue: 30th April 2009



Craig McIsaac

Managing Director
Clough Agriculture Ltd



Alasdair Reay

CEproof Directives Ltd
Keeper of technical documentation
in the European Union

